UNIVERSITY OF MYSORE

THE STONE-USING CULTURES OF

PREHISTORIC AND PROTOHISTORIC MYSORE

By

M. SESHADRI, M.A., Ph.D.

ASSISTANT PROFESSOR OF HISTORY AND ARCHAEOLOGY
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UNIVERSITY OF MYSORE

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PREFACE

The study of the stone-using cultures of pre- and proto-historic Mysore herein presented is intended initially to survey the evidence that has so far become available for the interior of Southern India. While the boundaries of Mysore State have been accepted as limiting the study from the geographical point of view, it has been necessary to transgress these political boundaries from time to time in order to include material which has an obvious bearing on the past of Mysore.

It must be admitted that the results of the present analysis of the material are modest and that they show up the gaps in our present knowledge rather than closing them. This is inevitable, however, in the case of an investigation of this kind and has the advantage of showing where special work should be done in the future.

From the chronological point of view this study covers the earliest period of mankind in Mysore, namely the Palaeolithic Period, and those periods during which microlithic stone tools were used. It is well known that at least part of the microlithic period is contemporary with the use of metal, but so little attention has been paid to the stone tool assemblages of the cultures in question that a considerable portion of the time involved in writing this book was spent on their study. Valuable publications have already appeared setting forth the evidence connected with other archaeological materials, the most important being Sir Mortimer Wheeler's on Brahmagiri and Chandravalli, and for this reason such evidence has been relegated to the background.

Throughout this present work the relation of stone tool-making man to his natural environment has been continually kept in mind. Stress has been laid on two obvious factors in this respect, namely the geographical situation of the sites and the availability of natural raw materials.

In addition to the collections of the Department of Environmental Archaeology, London University, which contain artifacts from numerous Indian sites, including a large number of microlithic and "neolithic" specimens presented by Col. D. H. Gordon, a study has been made of the Mysore material housed in the Government Museum, Madras, the Kibbanahalli material kept in the Geology Museum of the Central College, Bangalore, the British Museum, the Victoria and Albert Museum and a collection of specimens from Brahmagiri made by the writer.

In the course of the preparation of this work several friends have helped me. First and foremost, I owe a great debt of gratitude to Professor F. E. Zeuner who initiated me into the subject of geochronology in 1949, while he was in India by the special invitation of the Government of India to carry out a survey of prehistoric sites. Further training under him in London, especially in Stone Age typology, was possible owing to the generosity of the British Council to whom I express my sincere gratitude for their travel grant. My thanks are also due to Professor K. de B. Codrington, head of the Indian Department of the Institute of Archaeology, London University.

I am greatly indebted to the following people who have been kind enough to allow me to examine the specimens included in this work: Professors L. Rama Rao and B. S. Madhava Rao (Central College, Bangalore); Messrs. E. M. M. Alexander (British Museum) and J. Irwin (Victoria and

Albert Museum); and Mrs. B. Allchin (London). In addition Dr. A. Aiyappan (Madras Museum) kindly provided photographs of specimens from the Foote collection. I gratefully acknowledge the help I have received at their hands.

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Finally, I wish to express my gratitude to the Central Research Fund Committee of London University for a grant in aid of research work and to Professor V. L. D'Souza and other members of the Publication Committee of the Mysore University for a grant which has made the publication of this volume possible. In substance it is a greatly modified version of a much larger thesis submitted for the Doctorate in Philosophy of London University in 1952. Those requiring detailed information, especially typological tables analysing the material from various sites, should consult the thesis.

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Chapter I

ENVIRONMENTAL BACKGROUND

A. GENERAL CONSIDERATIONS.

The study of the natural environment is of great importance to the prehistorian. If he wishes to understand a culture as a function of mankind, the environment to which it was an adaptation must be reconstructed. In fact, it is one of the cardinal principles of human geography to trace the close connection that exists between physical regions and cultural areas. The distribution of culture is literally based on rock (Richards 1929).

During the Palaeolithic Period environment ruled man with an iron hand. Not only the extent of the dependence of culture on environment but also the closeness of correlation between them were greatest in the lower stages of cultural growth. In the subsequent stages man succeeded in making himself increasingly independent of local environment and at the same time exploiting it more efficiently.

Prehistoric archaeology may be regarded as ethnography projected backward in time. Environmental problems call for an intimate contact with the natural sciences, on which prehistoric archaeology relies entirely, both for chronological purposes and for establishing the environmental conditions that obtained during the particular period under consideration.

From the chronological point of view, however, the geological evidence of Mysore has not yet been made available. Work like that recently done by Zeuner (1950) in Gujarat is still wanting in southern India. But it is already possible to take advantage of geological and geographical observations, combining them with the distribution and material evidence of the stone-using cultures, in order to obtain some information about the dependence of the prehistoric people of Mysore on their environment.

B. THE SETTING OF THE SCENE.

Physiography. The State of Mysore is a well defined physical entity in the south of India. It is a table-land situated in the angle where the eastern and western ghats respectively converge towards the Nilgiri-hills and has been not inaptly described as a rocky triangle. The area extends between the parallels of 11°36′ and 15°2′ north latitude and between the meridians of 74°40′ and 78°36′ east longitude embracing an area of 29,474.82 square miles (excluding the Bellary region). This political limit is to some extent an accident of history and therefore should not strictly confine us to the above-mentioned area. Both in the prehistoric and historic periods a continuity of cultures prevailed in the contiguous and neighbouring territories, particularly of southern Bellary, a fact which is confirmed by geology.

The general elevation rises from about 2,000 ft. above sea level along the northern and southern frontiers to about 3,000 ft. along the central water-parting, which separates the basin of the Kistna (Krishna) from that

of the Cauvery (Kaveri)[1] and divides the country into nearly equal parts. These are further longitudinally intersected by hills, single or in chains, running parallel to the coasts. These hills are caused by the geological structure of the country, which is characterised by N-S trends, and they appear at one time to have been linked with the Annamalai, Palni, Travancore and Shevaroy hills, the eventual separation from them being due to marine denudation (Oldham, 1893). The landscape is undoubtedly of great antiquity, the Pleistocene having contributed only minor features. The broad open valleys, the low gradients of the rivers and the gentle undulating aspect of the country are characteristic of such an ancient land surface.

Mysore falls into two distinct physical regions called Malnad and Maidan. The Malnad or hill country lies to the west, bordering the western ghats and comprises the Shimoga, Chikmaglur and parts of the Hassan District. It is a region where the beautiful and the picturesque meet; of magnificent hills and forests. Rainfall is heavy and the vegetation belongs to the evergreen type.

As opposed to the Malnad, the Maidan or open country with its plains of alluvial black soil and rice-fields comprises a vast area including the Mysore, Bangalore, Tumkur, Kolar, Mandya and Chitaldrug districts. Here the rainfall is moderate with correspondingly open vegetation. It is not surprising that the Maidan bears the densest human occupation in Mysore at the present day, for thick evergreen forests with heavy rainfall do not lend themselves to the development of high civilization. The same condition appears to have obtained in the past. No prehistoric sites are known from the Malnad, except for a few Palaeolithic ones in the Maidan borderland. Palaeolithic man, being particularly attracted to river valleys, appears to have penetrated into the Malnad to some extent. It is, however, by no means certain that the climate was the same in Palaeolithic times. The evidence concerning this problem at present available from Mysore is too scanty.

Precipitation. Mysore is an area of extremes as regards rainfall. Although over the whole state the average rainfall does not exceed 36 inches, Agumbi in the Shimoga District receives 317 inches and Nayakanahatti, in the Chitaldrug District only 16 inches—the highest and the lowest rainfall areas respectively. In 4 out of the 9 districts, it ranges from 25 inches to 30 inches. The rainfall figures clearly indicate that

(a) the climate is wet in Malnad, and
(b) dry in the Maidan or open country, Chitaldrug District being the driest.

A consideration of rainfall and climate should interest students of human cultures because they are responsible for movement and migration of peoples and cultures (Brooks, 1949, p.9). There is a movement of people from regions which are naturally moist to regions which are naturally dry during a period of increased rainfall. In drier periods the direction of the movement is reversed. Peake (1922, p. 151) found it necessary to call in the aid of climatic fluctuations in order to understand the migrations of the

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(1) The old spelling of these rivers has been kept, although incorrect, to avoid confusion.

Aryans, whom he called '*wiros.*' Huntington (1924) believed that the rise and decline of the Maya Civilization of Yucatan could only be explained by climatic changes.

It seems possible that neolithic man of Brahmagiri, in the Chitaldrug District, had a damper climate, for in the lower layers of the excavations at that place there occurred a series of water-logged deposits, containing large quantities of snail shells.

The major river systems. The study of the river systems is of the utmost importance to the prehistorian, since prehistoric chronology is closely linked up with river chronology. The Thames in England, the Vézère and Somme in France, the Ilm-Saale system of central Germany are some of the classic European examples. Rivers have, at all times, provided man with water supply and lines of communication. In addition, they supplied him with his food. He could watch the animals that came to drink, and hunt them. Furthermore, the pebbles of the rivers constituted an important raw material for the manufacture of his tools. It is in these river terraces that we find large quantities of the discarded implements of Palaeolithic man. He lived in the valleys which provided him with raw materials for implements and kept a constant watch on the river banks for his prey. The well-known concentration of Palaeolithic sites in the river valleys thus proves to be real, and is not a fortuitous result of collection. As plate III shows, the majority of the Palaeolithic sites in Mysore are indeed situated in the valleys of the large rivers or their tributaries.

Later, with the development of agriculture in the Neolithic period, the river valleys became centres of man's activity in a different sense. For agricultural activities, proximity to the water supply was important, but equally essential was the availability of more or less level, arable surfaces. Hence, the Neolithic(1) and later agricultural settlements are often situated on river flood-plains. No wonder that the early civilizations in Egypt, India, China and Mesopotamia arose in river valleys, where the floodplains were wide and easily cultivated, and where seasonal flooding brought moisture and a suspension of fresh soil. The flooding restricts the settlements to artificial hills or to the sides of the valleys. In Mysore, Brahmagiri is a case in point, though on a small scale, since it is situated at the foot of a hill near a stream which even today floods the floodplain occasionally. It is natural, therefore, that river valleys play a prominent part in Indian prehistory. The Indus and the Soan in the Punjab, the Sabarmati in Gujarat, the Narbada in central India, the Godavari, the Kortallaiyar, the Palar and the Tungabhadra in southern India are outstanding examples.

There are three main river systems in Mysore, namely the Cauvery in the south, the Tungabhadra in the north and the two Pennars and the Palar in the east.

The Mysore portion of the course of the Tungabhadra is a very important river of the central Malnad. It is composed of the twin rivers Tunga and Bhadra, both of which rise at a place called Gangamula in the western Ghats. After being fed by a number of streams like the Haridra, the

(1) In referring to the Neolithic as applied to the Near East or Europe a capital "N" is used, but in India a small letter is used both for neolithic and microlithic since they are not regarded as periods.

Vedavati (Haggari), and the Kumudvati, it eventually joints the Kistna. Beyond the Mysore frontier, the Tungabhadra becomes a Maidan river. Bruce Foote (1916, p. 10) explored its banks beyond Mysore, and discovered at Hampasagara a very fine trap celt and megalithic and Andhra pottery. More recently, Palaeolithic tools were found at the same place by Dr. Subba Rao.

This site was visited by the writer in 1950, when he was a member of Professor Zeuner's expedition. Since no Palaeolithic sites have yet been stratigraphically studied in Mysore State itself and since Hampasagar lies only a short distance from the state boundary, it may be described here as an example of such site. The exact location is east of Gauri Nalla, where a double terrace is seen. The section extending to the higher level shows loose gravel on rock, covered by kankarised gravel and about 10 feet of kankarised silt. This carries a soil section with a grey A-horizon (c.2 feet) and a brown B-horizon (c.7 feet).

The palaeoliths came from the loose gravel, which is only a few feet thick. The thinness of these Palaeolithic gravels is a feature common to most rivers in the interior of South India. It means that they owe their existence not to an actual aggradation, but to the lining of the bed of the river of that time. Similar conditions were observed by Zeuner (1950) in Gujarat. The modern rivers have a similar pebble lining which is moved when the river is in flood but which lies dry and accessible to man in the dry season. This explains the large number of palaeoliths found is such situations: pebbles were collected and converted into implements on the spot. Many were of course rolled by the river later on. The implication is that the climatic conditions in the Palaeolithic need not have been very different from those of today. The climate was certainly not wet enough for laterite to be formed, and a dry season occurred regularly.

Foote states that he found "later Neolithic or early Iron Age cemeteries" in what is here described as the B-horizon. Both this material and palaeoliths are bound to be incorporated in the modern river, where the implements are frequently found in a rolled condition.

Mention must also be made of the Chinna Hagari basin, in the north-east corner of Mysore, a Maidan area, belonging to the Tungabhadra system The Chinna Hagari, a small river, is a tributary of the Hagari river, which flows through northern Mysore into the Bellary District. In its valley lie many historic and prehistoric sites, of which Siddapur, Jettingerameswar and Brahmagiri lie in Mysore, whilst many others, including Gudekallu, Hosahalli, Rayadrug, Mallapuram, Gallapalli, and Addaguppa belong to the Bellary District. But they all form a single cultural unit and belong to the microlithic complex.

The Cauvery (Kaveri) in the south of Mysore forms an entity by itself. Rising in Coorg, it flows through South Mysore till it abruptly quits the tableland at Sivasamudram. Some interesting historic pottery comes from T. Narasipur on its bank. At Lakshampura, 7 miles from T. Narasipur, on the left bank of the same river, pottery of the early historic period was found by Foote. Three or four miles from the Cauvery, similar pottery came to light at a place called French-rocks. Since both series contain sherds with graffiti, they appear to be of megalithic origin.

The Pennar, Ponnaiyar and the Palar are the rivers of south-eastern Mysore. The Palar plain beyond the Mysore boundary was examined by Foote (1873) in the early sixties of the last century. Further study of the Palar basin was carried out, with a view to elucidating climatic changes in south-east India in the Palaeolithic, by Richards (1932).

Geological environment. From this point of view, India is divided into three geological divisions, namely:

(1) the Peninsular shield
(2) the Indo-Gangetic plain
(3) the Himalayan Belt.

We are concerned only with the first part here (Plate I).

In the classification of the rocks of Peninsular India the word '*Archaean*' is commonly used. The term was introduced by J. G. Dana in 1872 to designate formations older than the Cambrian. In America its use is now restricted to the highly metamorphosed schistose, gneissic and granite rocks, while the term '*Algonkian*' is used to include undoubted original sediments lying below the base of the Cambrian. In India, the formations below the eparchaean (epi-archaean) unconformity have been included by Sir Thomas Holland under Archaean. Within the Archaean, a lower transition system (identified with the so-called *Dharwars* of Foote) and an upper transition system are distinguised but the Archeans and the Dharwar system are not different units, since the granites and the gneisses may merely represent certain horizons within the schistose members. This at any rate is the view of Dr. Krishnan (1949, p. 96).

Foote was the first to study the Dharwars in the eighteen-eighties. Dr. Smeeth's view that the Dharwars of Mysore are of igneous origin or the view of B. Rama Rao (1940) of the Mysore Geological Survey that some of them are undoubtedly of sedimentary origin need not concern us in this context. It suffices to know that the Dharwars have provided numerous raw materials for early man.

The Dharwars occur in Mysore in three geographic groups. They constitute a corrugated mantle, with a strike of approximately N-S, which conceals beneath it the granite complex. This corrugated mantle, usually called Schists, has the granites intruding into the very base of its system at different periods. They cover no less than 5,000 square miles of Mysore.

(1) The western group is the largest, occupying 3,000 square miles. It covers a large part of the Shimoga District. Further south it forms the famous (a) Bababudan belt in the Kadur District (b) Hole-Narasipur belt in the Hassan District and (c) Krishnarajpet belt in the Mysore District. The quartzites of a haematitic character, and the hornblendic rocks of the Bababudans were made use of by early man, who had many settlements in the Kadur and Shimoga Districts. (2) The central group, which runs through the town of Chitaldrug has a maximum width of 25 miles. In its total length of 170 miles, it includes the small belts of Chikkanaya-Kanahalli and Nagamangala and finally disappears near Seringapattam. The quartzites of Talya in the Chitaldrug area have been used in the manufacture of palaeoliths at that site.

(3) The eastern group, which consists of the Kolar belt of gold-bearing

vein quartz and hornblendic rocks, is only four miles wide and forty miles long.

The economic geologist has made a close and careful study of the Dharwars because of their economic wealth. But the Dharwars had already provided early man with excellent raw material for his tools, namely quartz, haematitic quartzite, hornblendic rock, and bands of chert and halleflinta. In the historical period, the dark grey crystalline limestone or marble, the emerald-green fuchsite-quartzite, serpentine and the grey potstones of this system were used for ornaments such as beads and carving work in the temples.

The granitic complex may be divided into two series, each probably representing a separate epoch of intrusion. The two series are called the older granites and the younger granites. The older granite or the Peninsular gneiss, the name given to a heterogeneous mixture of different types of granites intrusive into the schistose rocks, after the latter were folded, crumpled and metamorphosed, is the most widespread group of rocks in Mysore and South India. It consists of different types. Some are coarse and porphyritic, others fine and even grained; some are dark grey to light grey, others pink; some are streaky, banded and gneissic and others homogeneous. Broadly speaking, it includes (a) granodiorites (b) gneissic granites (c) banded or composite gneisses and (d) granites.

Somewhat different from the older granites in appearance are the younger granites, also known as the Closepet granites.[1] They form a band of 20 miles in width and run right through the middle of the State in a north and south direction from Sivasamudram on the Cauvery to Molakalmuru in the Chitaldrug District, a distance of 200 miles. Conspicuous among hills which belong to this series are those of Closepet, Savandurga, Sivaganga, Devarayana Durga, Madhugiri and Pavgada. They form a complex, which consists in the main of coarse granites with large platy crystals of shining pink or white feldspars. There are some other isolated masses forming the Hosdurga hills, the Arsikere and Banavar hill ranges and the Chamundi hill near the town of Mysore, which belong to this series. From our point of view, the granitic area is important because it is here that megalithic monuments are found most frequently.

The charnockites,[2] which form a younger group of rocks comprising a series ranging from acid to ultrabasic, is not very important from our point of view. Syeno-diorite is an intermediate and common type. In Mysore the Biligirirangan range of hills belongs to this series.

Reference must finally be made to some rocks which are very much younger than those discussed so far. There are numerous dykes of a basaltic character penetrating all the rocks mentioned. Most of them are dolerites, and they appear to be the "roots" of trap flows which once covered the country, as they still do in the northern part of the Deccan. Their distribution in northern Mysore is given in Plate II. They have provided most of the raw material of the neolithic celts.

(1) Outside Mysore, the same series has been described as Bellary gneiss, Hosur gneiss and Balaghat gneiss in South India The Dome gneiss of Bihar and the Bundelkhand gneiss also belong to the same system

(2) After the name of Job Charnock, founder of Calcutta, whose tombstone is made of this rock. The temples known as the "Seven pagodas" at Mamallapuram near Madras, are hewn out of this rock.

About the laterites that cap the earlier formations and that are the remnants of ancient soils nothing need be said here since, unlike those of the Madras area, they have not produced any human industries in Mysore.

From this brief discussion of the principal rock types of Mysore the following sequence emerges:—

8. Recent soils and gravels,
7. laterite rocks capping the Archaeans in horizontal sheets,
6. basic dykes, chiefly dolerites,
5. youger granite (Closepet granite),
4. charnockites,
3. older granite (Peninsular gneiss),
2. champion gneiss,
1. Dharwars (schists):—
   (a) **Upper Division:**
   Younger conglomerates, friable quartzites, thin bands of limestone admixed with volcanic material.
   (b) **Middle:**
   Older conglomerates, quartzites, chloritic and micaceous schists, limestones and banded ironstones.
   (c) **Lower:**
   Mainly igneous, consisting of basic and acid lava. Intrusive dykes.

C. EXPLOITATION OF THE ENVIRONMENT: ROCKS AS RAW MATERIALS OF EARLY MAN.

Geology governs the supply and the distribution of the raw materials of stone-using peoples. Hence, the distribution of prehistoric sites is often closely related to geological features. All rocks have not the same degree of hardness, nor do they fracture in the same way. In northern Europe before the Neolithic, for example, flint was as a rule used for tools, since it could be easily shaped by chipping or pressure flaking. In India and South Africa man had to fall back on other, and generally inferior, local materials. These differences of raw material greatly influence the final appearance of the tools, as some materials lend themselves to, or even compelled man to use, special techniques (Burkitt, 1928, p. 26). Another instance of the influence of the geological element of environment can be very well illustrated by the remarkable though little explored megalithic culture of southern India. The distribution of monuments relating to that culture coincides with that of the Archaean rocks, gneiss and granite, perhaps because only these provided suitable slabs for the construction of megalithic structures.

Later, in the middle ages, the same factor assisted in the evolution of the spectacular southern style of temple architecture, with its great blocks of stone and its pyramidal corbelled roofs.

The following alphabetical list contains the chief types of minerals and rocks used by man in Mysore and encountered in archaeological sites.

Agate:—Agate consists of a mixture of colloidal and cryptocrystalline silica deposited in amygdaloid cavities in the volcanic rocks known as traps. If

banded, it is called agate. Being considerably harder than the trap rock itself it survives well as pebbles in trap. Hence agate was much used by microlith-makers. Since the nodules are rarely larger than fist-size, they do not lend themselves to the making of large tools. Its homogeneity in all directions makes it superior even to flint from the point of view of flaking, but the small size of the specimens has always restricted its use. From the neolithic onwards, its beauty came to be appreciated and it was ground and polished to make beads and other ornaments. The word agate is actually of Indian origin (Akik) according to Wadia (1926).

In Mysore agates are not frequent, but an agate core was found at Brahmagiri.

Andesites:—Andesite is a grey volcanic rock containing mainly plagioclase-feldspar and hornblende. It has thus the composition of diorite, a term sometimes applied to coarse grained andesite in the south of India. It was often used as a raw material for celts and is a very frequent trap rock.

Basalt:—Basalt is a blackish volcanic rock containing mainly plagioclase-feldspar and augite. It is found in the trap series and was much used for celts in the same manner as andesite.

Bloodstone:—Bloodstone is a green variety of chalcedony speckled with red. It was used, where found, in the same way as other chalcedonies, but is rare. It is not represented in the Mysore collections available for study, though there is no reason why it should not occur, since it is present in the collection of tools in the Department of Environmental Archaeology, London University, from Hyderabad and Ellora.

Carnelian:—Carnelian is a translucent reddish variety of chalcedony and occurs in the same manner as agate (q.v.). Carnelian was used fairly extensively at Brahmagiri.

Chalcedony:—Chalcedony is the covering name for cryptocrystalline silica usually containing very small amounts of water. Apart from forming in volcanic rocks containing cavities it occurs in veins and as nodules in limestones. It varies enormously in colour and has received many names. The banded varieties for instance are called agates and were used by early man for microlithic artifacts (see agates).

Charnockite:—Charnockite is a collective name for a group of dark coloured gneisses containing hypersthene. A large mass of them occurs just to the south of Mysore, and small areas are encountered in the southern part of the State. They have never been used by early man, to the knowledge of the writer, and are mentioned here because the name is familiar to most workers in southern India.

Chert:—Chert is a greyish variety of cryptocrystalline silica rather impure and varying in colour from light grey to black. It fractures flatter than quartz or flint but often contains joint surfaces and invisible cracks. It is avoided therefore where better raw materials are available. It occurs in the form of beds or nodules in limestone formations. Chert was used at Brahmagiri as evidenced by a specimen found by the writer.

Diorite:—Diorite is a plutonic rock (like granite) but of the composition of andesite. The coarsely crystalline dolerites are sometimes mistakenly called diorites.

Dolerite:—The term dolerite is much used for the somewhat coarsely crystalline rocks of andesitic and basaltic composition. Dolerite is used for the manufacture of celts.

Granite:—Granite is an igneous rock which solidified at a considerable depth. It cooled slowly and is therefore coarsely crystalline. It consists of quartz, feldspar and mica or hornblende. As a result of weathering, granite assumes the shape of rounded hills and giant boulders in tropical countries. These boulders provided an important raw material for man from the magalithic period onwards. Suitable blocks were used with little or no artificial shaping. Once the art of stone carving had developed, giant granite boulders became the raw material for the remarkable monolithic architecture of South India as exemplified by Vijayanagar and Mamallapuram.

Another property of granite is the tendency to platy jointing near the surface. Though occasionally due to magmatic phenomenon it is in India very commonly caused by thermal weathering. The surface layer to a certain depth expands in daytime owing to intense insolation whilst it cools at night and contracts to a similar depth. The jointing thus produced makes it easy to detach large plates and these have been used abundantly in the construction of megaliths. It is easy to understand therefore why megalithic sites are so often situated at the foot of a granite hill which provided the raw material. It was a convenient position, for all that was necessary was to shift the slabs and boulders down-hill. As the geological map shows (Plate I) granite occurs in vast areas of Mysore outside the Dharwar series.

Gneiss:—Gneiss is a metamorphic rock of granite composition, in which some or all the constituents are arranged in a horizontal band. It occurs abundantly in Mysore and in many other places. It weathers after the fashion of granite and was then used in a similar way.

Jasper:—Jasper is opaque cryptocrystalline silica very like chert or flint but of red, brown or yellow coloration. Occasionally it is banded, as are, for instance, Egyptian jaspers. There are also some green varieties. Jasper is a very common raw material for microliths in India. The brown and red varieties as well as the greyish-pink ones occur at Brahmagiri. Being formed either in cavities like chalcedony or agate or from sedimentary cherts by heat alteration in contact with igneous rocks, jaspers are frequent all over southern India. They occur in the Dharwar series, for instance, and are therefore common in many rivers.

Opal.—Opal is hydrated silica, amorphous even under the microscope. It occurs in much the same way as agate but has a more glassy lustre A milky opal, sometimes stained brown, has been used on a large scale at Brahmagiri by the microlith-makers. A small core in the writer's collection is made from a broken pebble and confirms that this raw material was obtained from fluviatile deposits.

Potstone:—Potstone is a magnesia-containing, ultra-basic rock of the igneous group. It belongs to the Dharwar system and occurs, according to Ramo Rao, in the areas of Hole-Narasipur and Krishnarajpet and also as lenses in the granulitic rocks of south-western Mysore. On the whole, it came into use only with the development of architecture, particularly under the Hoysalas.

Quartzite:—Quartzite is either a sandstone in which the grains are cemented together with silica precipitated from watery solutions, or sandstone, the

grains of which are fused by heat metamorphosis. The former kind is frequently associated with sedimentary rocks, whilst the latter is found in the company of schists and gneisses. The latter type is abundant in Mysore, though originally restricted to the Dharwar series. Being very hard, these quartzites form resistant pebbles which make up the large proportion of the river gravels. These in fact were the main source of quartzite for the making of palaeolithic and microlithic artifacts. Most quartzites are brown or reddish brown, the colour being due to a content of haematite or limonite, but many other colours occur. In the microlithic of Brahmagiri, they are represented by the red, pink and green varieties. The green variety, though on the whole rare, is frequent at Brahmagiri, where it occurs in the microlithic assemblages.

Rock-crystal:—Rock-crystal is pure crystallised silica free from water. The crystals may be large, sometimes a foot long, and have the characteristic shape of a six-sided prism terminated by a pyramid. These crystals were formed in cavities from a watery solution, growing from the wall into the cavity. They are therefore associated with the amygdaloid cavities of trap rocks and thus occur together with chalcedonies. But they form also in open fissures in all sorts of crystalline rocks and even sediments. They are therefore widely distributed everywhere. On the whole, however, specimens large enough to serve as cores for the manufacture of artifacts are of local occurrence. Single specimens are found on almost every microlithic site and they are represented both at Brahmagiri and the Bangalore sites. Occasionally an occurrence of rock-crystal leads to a whole industry being made from this material as for instance in Bandarawela, Ceylon.

Serpentine:—Serpentine is a rock consisting mainly of hydrous magnesium silicate. It is formed from other rocks which contained olivine, augite or hornblende, either by metamorphic processes or under the influence of deep reaching water action. It is therefore not an original igneous rock but derived from peridotites. The colour is mainly dark green, and it has a soapy feel. Although it can be cut with a knife and therefore easily carved and polished, it is remarkably tough and not easily flaked. It has therefore been used by neolithic man wherever possible for the manufacture of polished celts. Many so-called greenstone axes are of serpentine. Serpentine occurs in Mysore in the same areas as potstone (q.v.), but the writer has not so far seen serpentine axes from Mysore localities.

Trap:—Trap is the covering term for the vast sheets of lava which were poured out over the Indian peninsula in the Cretaceous and early Tertiary periods. They are of considerable thickness, and many sheets lie on each other. The north-western part of the peninsula is still largely covered with them and this gives the country its characteristic plateau appearance. In the south and east of the line from Goa to Janakpur, however, the trap has been eroded away, so that the underlying Dharwar series and the basement complex are exposed. There is therefore no trap lava in sheet form present in Mysore. Nevertheless, at some time in the Tertiary, at least in part, it must have been covered with trap, for there are numerous dykes (fissures filled with volcanic material) present which intersect the basement complex. These are the " roots " from which the lava sheets were once poured out.

Petrologically, trap is of varying composition, trachytes, andesites and basalts being encountered. They are mostly fine grained, but the sheet lava

is frequently porous as the result of the original presence of gas in the lava. For this reason, the sheet lava is not first-class material for Stone Age tools. On the other hand, the rocks of the dykes are extremely dense and afford a first class raw material. It is for this reason that the famous neolithic factory sites are not situated on the trap sheets of the Deccan but in places in the basement complex area, where trap dykes crop out. The abundance of celt factories in Bellary, Hyderabad and northern Mysore all belong to this category.

In describing the trap dykes of Bellary, Foote (1895) included porphyritic examples occurring at Kallakurti, one mile south of Malyam in the Rayadrug Taluk and at Hurlihal in the south-eastern part of Kudligi Taluk. The Harapanahalli dyke, which is nearly 8 miles long, forms hilly ridges of diorite. Strictly speaking the term should be confined to basic volcanic rocks, such as basalt. But since in practice it is difficult to find out accurately the composition of trap without chemical or microscopic analysis, all dense, greyish, greenish or blackish volcanic rocks are called by this name. The word trap is derived from the old Swedish " trappa " which means step or stairs.

Of the 260 dykes discovered by Foote, some are of great importance. The Golla-Linganahalli dyke, beginning at the extreme south end of the Sandur Syncline crosses the Rampur spur of Mysore territory. This together with the Kailasa Konda dyke west of Raidurg, if continuous, would be 38 miles in length. These dykes are conspicuous because they contain many high crests of jet black colour. They must have been the favoured spots of ' neolithic ' man of Brahmagiri, south Bellary and Rayadrug, sites which all lie in and round the Chinna-Hagari river. The Woddarhully dyke was also easily accessible to neolithic man of Mysore, being only three-quarters of a mile from the Jettinga Rameswara hill of the Molakalmuru Taluk, Chitaldrug District.

All trap rocks have a splintery or conchoidal fracture and are devoid of quartz. Though hard and tough, they can easily be ground with the aid of quartz sand, which is harder than the minerals composing the trap rocks.

Trachyte:—Trachyte is a white to grey volcanic rock containing mainly orthoclase-feldspar and a dark component, usually biotite-mica. It is found in the trap series and was occasionally used for celts, though no specimens are known from Mysore.

Vein quartz:—Vein quartz is a rock which occurs commonly in the form of dykes in the igneous areas. It is very frequent in the basement complex of India. The crystals may be small, of sand grain size, and the vein quartz then resembles metamorphic quartzite. But often the crystals are large and more or less translucent. From the point of view of prehistoric technology, vein quartz was a second-rate material. Lumps of even texture are small, and they are apt to fracture in unexpected directions. Nevertheless, being so very abundant this material has been used where others were scarce. The Bangalore industries for instance consist almost entirely of it. It fractures with a rough and uneven surface and the bulbs of percussion are flat. The colour of vein quartz is mostly white, but occasionally grey or yellow. Vein quartz was used by Palaeolithic man in Mysore in about 10% of the cases.

Chapter II

THE PALAEOLITHIC INDUSTRIES OF MYSORE

A. NOTES ON THE PALAEOLITHIC OF INDIA IN GENERAL.

In 1861 Bruce Foote of the Geological Survey of India discovered the first Palaeolithic artifact in the debris of a pit in the laterite gravel at Pallavaram near Madras. His discovery aroused sporadic zeal among the few who were interested in prehistory at that time. Wynne, for example, discovered an agate flake near Paithan in Hyderabad, Deccan, in 1865. Hackett found a quartzite hand-axe embedded at Bhutra on the Narmada. After Foote, King and other pioneers had made their discoveries, a prolonged lull followed during which Indian archaeologists were mostly engaged in the study of historic civilizations.

Palaeolithic studies received a fresh impetus when in the twenties of this century Cammiade and Richards began further explorations in South India. Their vast collections were interpreted by Miles Burkitt. In the publication by Cammiade and Burkitt (1930) an attempt was made to correlate the industries with certain climatic cycles.

In northern India the presence of Palaeolithic artifacts was first reported from the valley of the Soan River (now in Pakistan) by D. N. Wadia in 1928. Todd in 1930 noted the site of Pindigheb. Following the expedition of De Terra, Teilhard de Chardin and Paterson in 1935, the Palaeolithic industry known as the Soan was described (1939). In this publication an attempt was made to correlate the pluvial cycles of South India postulated by Burkitt with the glaciations of the North, an attempt which in the light of new observations made in Gujarat (Zeuner, 1950) cannot be regarded as satisfactory.

In the following paragraphs, the Palaeolithic industries of India are briefly characterised. This is necessary in order to provide the background for an analysis of the finds made in Mysore.

Punjab. The data obtained by De Terra and his co-workers indicate that the Palaeolithic sites of North-western India (now Pakistan) fall into three main groups. It is necessary to discuss these at some length, since they provide the framework for the Palaeolithic of India as a whole, including Mysore.

Group I of the Punjab industries consists of such sites as Adial, Chaomukh, Kallar, Jammu, and Malakpur. In the boulder conglomerate is found an industry which has been described as 'Pre-Soan' by De Terra and assigned to early Middle Pleistocene, i.e. the "second glacial stage." This industry consists of very large, thick flakes which are heavily rolled and exhibit prominent cones of percussion, plain striking platforms at 100° to 125° to the long axis of the tool and frequently a large area of cortex on the upper surface. Secondary flaking is entirely absent with the exception of one specimen that was reworked at a later date. Instead of designating this industry as Pre-Soan, Movius (1949b) considers it desirable to call it the "Punjab flake industry," since the older term might convey a chronological meaning which it does not necessarily possess.

To the second group belongs the Soan industry which is characterised by the presence of pebble choppers, chopping tools and flake tools. The evidence from ten sites in the Indus and Soan valleys appears to suggest that the Early Soan culture belongs to the " second interglacial stage " of Northwest India. The choppers were mostly made on rounded, oval or flat pebbles flaked on the upper surface only, along one edge. In other cases pebbles appear to have been intentionally flattened on one surface to form the base of the tool.

The Early Soan has three sub-groups. Sub-group A has no flakes. B contains Clactonian flakes and cores from which these flakes were struck. In the sub-group C there occur, in addition to the Clactonian, flakes with facetted striking platforms and tortoise cores. The implements of A are heavily patinated and thoroughly worn; those of B are deeply patinated but not worn, and those of C are fairly fresh (De Terra and Paterson, 1939).

The Late Soan comprises two industries, A and B, of which A is earlier and B later. A comes from the gravel of the " third glacial stage," and B from the Potwar clay above the gravel. Though pebble tools still survive in A, the great majority of the tools are flakes. It looks, therefore, as if the industry was not a mere development from the Early Soan. It is distinctly Levalloisian, though the high-angled platform flakes are still prominent.

Industry B has the same cores as Late Soan A. Fifty per cent. of the flakes have facetted platforms, but there is no retouch on the flake edges. Most of them have large primary flaking on the upper surface and have certain resemblances to the Late Levalloisian of Europe (De Terra and Paterson, 1939).

The third group of the Punjab industries is remarkable because it contains the typical Abbevillio-Acheulian hand-axe complex. It is found at the site of Chauntra, the stratigraphical position of which, relative to the Soan, remains to be determined in detail on a geological basis. From the typological point of view the earlier material from Chauntra contains both Soan and Acheulian types of implements. This may be significant, indicating cultural fusion. The hand-axe complex recalls European and African affinities, whilst the pebble choppers, chopping tools and flake implements, which this industry has in common with Java and Burma, suggests eastern affinity (Movius, 1949b).

Gujarat. Proceeding in a southerly direction, the next area where Palaeolithic finds have been studied in detail is Gujarat. Geographically as well as typologically, it may be regarded as a kind of half-way house between the Punjab and South India. Sankalia (1946) described the sites and industries. Zeuner (1950) discussed the geological age of the industries and suggested that it might be approximately " Penultimate Glaciation or perhaps a little later."

From the typological point of view, the industry of the gravel phase (R) contains artifacts ranging from pebble-tools of pre-Abbevillian appearance, many of which are comparable with the Soan, to well-finished hand-axes of Late Acheulian type. There are also many flakes, some of Levalloisian appearance, and discoid cores. Among the Acheulian types, ovates and cleavers occur besides pointed hand-axes. This industry is not a true Soan, though the presence of numerous choppers indicates a relationship. Zeuner

is inclined to regard it as a combination of Late Soan with Middle to Late Acheulian elements.

Madras. The Palaeolithic of South India is characterised by its hand-axe complex. Large numbers of implements have been found in the terraces of the Korttalaiyar valley of the Chingleput District, Madras Presidency. Of the terraces T^0, T^1, T^2, and T^3 which are all of Pleistocene age, T^0 is the oldest and the highest. It comprises the laterite peneplain. The three other terraces are cut into this peneplain, representing three stages of halting of the erosion process combined with some sedimentation. These halts are perhaps due to eustatic movements of the sea level.

The two most important sites of the Madrasian hand-axe industry are Vadamadurai and Attirampakkam, studied by Krishnaswami (1938 a and b; 1947). Early man of Attirampakkam had excellent supplies of fine quality quartzite from the Alicoor-Satyavedu boulder conglomerate of Jurassic age.

Five different industries have been recognized at Attirampakkam.

I. Industry with Abbevillian hand-axes, made on large pebbles of red quartzite, with thick pebble butts and showing a white cortex. They are identical with those from the boulder conglomerate of Vadamadurai. On grounds of patination Krishnaswami recognizes three stages of this industry. By stage three, Acheulian influence had become apparent and controlled flake scars are prominent. Cleavers are absent.

II. Industry comprising Early and Middle Acheulian types with laterite staining, on the degree of which 4 stages of the industry are distinguished. The tools are much advanced over those of Industry I. Cleavers begin to appear.

III. and IV. Industries with Middle and Late Acheulian forms, with little or no staining.

V. With Industry V, a derived series is found. This contains rolled Abbevillian and Early Acheulian hand-axes. The contemporary series, i.e. Industry V proper, is quite fresh and free from laterite staining. The technique shows the peak of perfection, and its Late Acheulian forms are comparable to those of Europe and Africa. There is an amazing variety of forms of hand-axes and cleavers.

The preceding summary of the major areas of Indian Palaeolithic has been presented in order to provide the necessary background for the interpretation of the Palaeolithic finds that have been made in Mysore State. This material is still scanty; nevertheless, a general idea of its typological affinities can be obtained already.

B. PALAEOLITHIC SITES IN MYSORE.

There are about ten localities at which Palaeolithic specimens have been found in Mysore. For the benefit of future workers, they may be briefly described (see Plate III).

Tumkur District. (1) Kibbanahalli and (2) Biligere, both in the Tiptur Taluk. At the eastern foot of the Banasandra hill range, one mile south of Biligere, some Palaeolithic tools were found in a gravelly layer below a thick accumulation of rainwash by Sampat Iyengar (1924) who considers this as

a Palaeolithic factory site. The occurrence of 'hammer-stones,' however, and of implements described as 'curved saws,' 'arrowheads,' 'guillotine chisels,' and 'circular slings,' together with other Palaeolithic material shows that later material is also present on the site.

Shimoga District. (3) Nyamati, not far from the left bank of the Tungabhadra river, is a small town situated on the Honnali-Ayanur road in the Shimoga Taluk (14°9'N. 75°38'E.). It occupies a favourable position, being in the region of transition between the Malnad with its heavy rainfall and evergreen vegetation and the Maidan, the open country. At this locality, two pebble-tools (Nos. 224 and 225) were found by Bruce Foote in a 'shingle bed,' presumably an ancient gravel terrace of the Tungabhadra, comparable with similar sites in the adjacent Bellary District.

Chikmaglur District. The Chikmaglur District has two important sites and a minor locality.

(4) South of the Traveller's Bungalow at Kadur, a small town, a hand-axe (No. 226) was found.

(5) From the lateritic debris of Nidaghatta, a village in the Sakrepatna Taluk, three implements were recovered.

(6) Five miles south of Nidaghatta, lies Lingadahalli which appears to be a promising site for further work. It has yielded several implements now preserved in the Foote collection of the Madras Government Museum.

Chitaldrug District. (7) Three implements have been found in the lateritic debris of Talya, Holalkere Taluk.

(8) Two more come from the talus at the foot of Jyankal, another site in the same district.

Hassan District. (9) Karadigudda, a minor site in the Hassan District has produced only one or two Palaeolithic implements so far.

Mysore District. (10) Ranganathapura on the Cauvery (Kaveri) river in the Bannur Taluk appears to be a minor site. One or two implements from this site are preserved in the Geological Museum, Central College, Bangalore.

Palaeolithic man's activity in Mysore was largely influenced by the availability of excellent quartzite pebbles which provided the raw material for his tools on a majority of sites, i.e. (3), (4), (5), (6), (7) and (8). These sites are not far away from rivers, and it is probable that the raw material was derived from terrace gravels.

C. ANALYSIS OF THE MYSORE PALAEOLITHIC INDUSTRIES

It is exceedingly difficult to decide upon the terminology to be used in describing the Palaeolithic implements from Mysore State. Movius (1949 b) has introduced the terms "chopping tool," "hand adze," "proto hand-axe" and "chopper," but these have proved inadequate in describing artifacts from South India. It has therefore been considered advisable to use the term pebble-tool wherever the original shape of the pebble still contributes decisively to the shape of the implement, and the terms "chopper" and "chopping tool," as defined by Movius, have been retained. For the more

developed types the terms hand-axe, ovate, cleaver, scraper, etc., are available as used in the Palaeolithic terminology of Europe. The remainder of the characterisation has been done by the addition of descriptive adjectives.

In the following list the artifacts are described in order of their localities as enumerated in the preceding paragraphs. All registration numbers given refer to the collection of the Madras Government Museum, unless otherwise stated (as for instance, those from Kibbanahalli, which refer to the Central College, Bangalore). The plates and figures refer to the present paper, unless otherwise stated.

Kibbanahalli. There is a large collection of artifacts in the Museum of the Geology Department of the Central College, Bangalore, collected from this site by Professors Sampat Iyengar and L. Rama Rao. The artifacts were found in the neighbourhood of the Banasandra hill range, which is roughly two miles and a half from Banasandra, a small railway station of the Bangalore-Arsikere branch of the Southern Railway. This region covers an area of half a square mile. Professor Iyengar also found many implements in the irregularly exposed gravelly layer in the nullas below an accumulation of rain-wash or brick-earth, which varies from 2 to 8 feet.

The region was ideally suited for an open camp site, and the neighbouring valley ensured Palaeolithic man's water supply. Furthermore, there was the availability of an inexhausible supply of intensely-jointed quartzite, the raw material for his tools. The area in and around Kibbanahalli was surveyed geologically by Wetherell (1900-1901). The rocks fall into three groups, namely schists, gneiss and granite, the schists predominating. Kibbanahalli lies in the schist area, but quartzites occur about six miles to the south, not far from Banasandra, and the haematite-quartzites about 3 miles to the north-east. Many quartzite pebbles, however, were used, and the river valleys were probably more important as a source of supply than the outcrops. The river east of Kibbanahalli village actually comes from the haematite-quartzite outcrop and this is, therefore, the most probable source of raw material used. The implements may be classified into the following groups.

Hand-axes on cores:—The hand-axes represent the largest group in the collection and fall into three classes, namely:

1. Rostrocarinate-like tools.
2. A series of crude hand-axes.
3. A more refined group, which is characterised by secondary working along the working edge. It comprises hand-axes as well as ovates.

The implements which may be assigned to the first group are of two kinds; there are triangular pieces of rock showing smooth joint planes, and tapering at the end. Though there is not much working on them, they were probably used as grubbing tools (the so-called Eoliths of Iyengar). In addition, there are other specimens deliberately shaped so as to have a triangular cross-section. Allchin (1952) already noted that one of these rostros is made of quartz.

The implements of the second group may be classed as Abbevillian in technique. Z6/643 is a large pebble with a few rough flakes removed from both sides to form a crude hand-axe. Z6/62 may be regarded as an inter-

mediate form between an ovate and an Abbevillian hand-axe. Alternatively it might be classified as a "chopping-tool," as defined by Movius. Z6/71 is an interesting specimen of a hand-axe, deliberately flaked on one side, and with natural fractures on the other. The unworked surface shows the beautiful bands characteristic of the quartzite in this area. Another specimen worked on one face only is Z6/569, which has a pointed end and roundish butt. Z6/56 is a hand-axe of a pointed type. It is asymmetrical and may almost be regarded as a large borer, though there is no evidence that it has been used as such. Four large flakes have been removed to produce the point, and there is no zig-zag edge. Z6/631 is a well-made bifacial hand-axe, but it still has the zig-zag edge characteristic of the Abbevillian technique. It has a slightly pointed base and is almost symmetrical (Pl. VI, fig. 6). Z6/16 and Z6/499 are of the same type, though with broader bases and the former exhibits the banded nature of the quartzite.

The third group comprises hand-axes which are comparatively thin and show secondary working, such as is characteristic of the Middle or Late Acheulian of Europe, though the raw material—quartzite instead of flint—has impaired the quality of the workmanship. Z6/50 retains large portions of the original pebble cortex, both at the butt and on the body, but has good secondary working along the edge (Pl. VI, fig. 5). Z6/20 may be described as a rough ovate, rather than a hand-axe (Pl. VI, fig. 4) and Z6/728 is a slightly more-finished ovate. Z6/510 is one of the few specimens made of quartz. Though slightly pointed it may be described as an intermediate type between an ovate and a hand-axe. It has good secondary working, and typologically is reminiscent of Stage V of Attirampakkam.

Pointed flakes:—This assemblage includes a large series of flakes resembling hand-axes in outline. Some may have been used as such. There are two types; some are massive, seven to eight inches in length, struck by the Clactonian technique. Good examples are Nos. Z6/668 (Pl. VII, fig. 6), Z6/128 (Pl. VI, fig. 10), Z6/520, Z6/501, Z6/58 and Z6/634. The first two are crude massive flakes struck off from lumps of rock which were more or less dressed on the surface before the flake was removed. They show prominent bulbs of percussion and have blunt apices which would have been suitable as substitutes for the points of hand-axes.

The second type consists of flakes that have been struck almost at right angles to the striking platform, well illustrated by Nos. Z6/601 and Z6/523. The former has a large bulb of percussion and the latter is extremely rolled. Functionally they cannot be separated from the first type.

Some of the specimens show coarse secondary retouch on the edges, for instance Z6/540. Z6/450 is a specimen on a thin, triangular flake with good secondary working all along the edges. No. Z6/55 also belongs to this group. These flakes are smaller and link the group with the scrapers on flakes.

Cleavers:—There is a large number of cleavers of interesting shapes, which may be classified according to their mode of manufacture as:

(a) Cleavers on cores, and

(b) Cleavers on flakes.

Amongst the first group is an interesting example of a cleaver made on a pebble (No. Z6/18). It is flaked all over on both faces, except for a small

area on one face at the butt end where a little of the pebble cortex is left. This specimen is transitional between a hand-axe and a cleaver.

Nos. Z6/597 and Z6/435 (Pl. VI, fig. 2) have rounded butts and almost straight cutting edges. They represent type L of the Attirampakkam cleavers as classified by Krishnaswami (1938). Z6/33 (Pl. VI, fig. 7) is a fine example with a straight broad cutting edge and a conical butt. It has a striking similarity to cleavers Type J/K of Attirampakkam V. Undoubtedly it is the most characteristic cleaver of the whole assemblage. No. Z6/73 is made of quartz.

Most of the cleavers in the second group have a straight cutting edge (Nos. Z6/484, Z6/612, Z6/75, Z6/648, Z6/72, Z6/32, Z6/39 and Z6/665). From specimen No. Z6/32 (Pl. VI, fig. 3) colloidal silica has been removed by weathering on the bulbar face. It has a slightly pointed butt. Z6/504, which has a glossy black patina all over, has an oblique cutting edge. In No. Z6/665 the banding of the quartzite from Kibbanahalli is clearly seen. From the point of view of technique, No. Z6/39 (Pl. VI, fig. 1) is interesting, for it is asymmetrical in outline, and very roughly trimmed on both sides. There are, however, large patches of original cortex left on both faces. The cutting edge shows a notch due to the use of the implement. The specimen looks more primitive than the well standardized cleavers of Attirampakkam V.

No. Z6/90 may be regarded as a cleaver on a thin flake. The butt is flat and straight, while the cutting edge is semi-circular. This is an unusual type.

Beaked implements:—One of the special characteristic features of the Kibbanahalli assemblage is the presence of a number of beaked tools made both from cores and flakes. A number of flakes are removed to produce a point or beak by a technique generally associated with the industry at Clacton-on-Sea. In the case of these Clactonian tools, the point is produced by a 'three-blow-system,' the blows being delivered in an anti-clockwise direction round the intended point. Two flakes are thus removed from one face of the core or flake, and the third flake removed from the other side turns the ridge between the first two flake-scars into a point.

Many of the specimens from Kibbanahalli exhibit a striking resemblance to these Clactonian implements, as for instance those from the Jaywick collection (Department of Environmental Archaeology, London University). No. Z6/695 (Pl. VI, fig. 9) is an example.

No. Z6/236 (Pl. VI, fig. 8) is a fine tool, with a beak produced by three flake-scars on the upper surface and one large flake-scar on the lower. Z6/494 conforms to the 'three-blow system,' and the point, which is broken, has been slightly retouched.

When the implement is made on a flake, two blows only are often enough to produce the required beak. Z6/60, for instance, was made in this way on part of a pebble. It has retouch along one edge of the beak. Z6/95 and Z6/685 are small thin flakes of the same type.

No. Z6/61 is a hand-axe-like implement on a flake, but on the bulbar face a secondary flake was struck off and a sharp point formed, the tip of which is now broken.

No. Z6/620 is an aberrant specimen, the point being the result of a single blow which has detached a long flake all through the body of the implement. The point of impact and the bulb of percussion are present.

Choppers:—Among the Kibbanahalli artifacts there is a group which corresponds to the unifacial "chopper" of Movius. It consists mostly of massive flakes with working confined to the non-bulbar face. In some cases the bulb of percussion has been removed to facilitate holding in the palm. In this group, however, there is one specimen (Z6/611, Pl. VII, fig. 5) which still retains its bulb and is of the rough Clactonian type.

Chopping tools:—A number of chopping tools (in the sense of Movius) are also present. They are bifacially worked and have sinuous cutting edges. Some of the specimens, such as Z6/76 have been worked to produce an edge all round, and so this group grades into that of discs.

No. Z6/610 (Pl. VII, fig. 4) is a nicely finished chopping-tool, though a patch of original cortex remains on both faces. It has a relatively straight cutting-edge. No. Z6/125 has had large flakes removed alternately from either side to produce a zig-zag edge. These two specimens are the most characteristic of the group as a whole.

Discs:—Most of these are made on cores, but there are some flakes which may be classed in this group rather than as scrapers. Z6/44 is an almost circular disc on a core. It is weathered, probably by the removal of colloidal silica from the quartzite. Nos. Z6/23, Z6/551 (Pl. VII, fig. 3) and Z6/21 are on cores. No. Z6/515 is made on a flake and is rather oval in shape. Nos. Z6/583 and Z6/434 still retain their bulbs of percussion.

Flake tools:—Many smaller flake artifacts have been found in addition to the larger types at Kibbanahalli. Some of them are doubtless waste flakes, but a large percentage have been retouched and used. It is difficult to classify them functionally since each group grades into the next, but they can be roughly divided as follows:—

Nos. Z6/471 (Pl. VI, fig. 11), Z6/107, Z6/544 and Z6/555 (Pl. VII, fig. 2) may be regarded as points. Z6/544 retains some cortex, but one end has been worked. Retouch can be clearly seen running along one edge of the point. Z6/521 is a Clactonian flake with the bulb of percussion still present. Three small flakes have been removed from the bulbar face to form the point. Z6/646 is a well-finished specimen. It is a thin flake which has had a small secondary flake removed from the bulbar face and steep retouch along both edges of the point. Nos. Z6/104 and Z6/714 are triangular flakes which may be regarded as points; the latter shows marks of use along one of the sides of the point. No. Z6/448 has been described as a Mousterian lance-head by Sripada Rao (1932). There is, however, nothing typical of the Mousterian in the artifact. It appears to be a plain "Levalloisian flake," 4 ins. long with an unprepared right-angle platform. It shows slight retouch which has been worn, probably by rolling. It may be regarded as a point.

No. Z6/449 is an asymmetrically pointed flake of stained fuchsite-quartzite, 4.3 ins. in length. There is some working on the flake but hardly any retouch, and certainly no resolved flaking (Sripada Rao, 1932). It also appears to be a simple "Levalloisian flake" with an unprepared right-angle platform. Functionally a point.

There is still another group of retouched flakes which may be regarded as borers. The best example of this group is No. Z6/593 (Pl. VII, fig.1) which is a thin flake, about 3 ins. long, with a steep retouch along one side of the point. This retouch produced a concavity which emphasises the sharpness of the point and would have facilitated boring holes in skins and hides.

Scrapers:—All types of scrapers are present in the collection and they are mostly made on flakes. Side scrapers and hollow scrapers dominate the whole assemblage.

End scrapers:—They are rare, but two examples may be noted. Z6/82 is a thick, almost circular flake, but as it has been retouched along about 2 ins. of the periphery to make a straight edge, it may be classed as an end scraper. No. Z6/42, a thin flake, has the end retouched only on the bulbar face. No. Z6/88 might be regarded as a rather coarse end scraper. There were some tools which were used as side scrapers or end scrapers as occasion demanded, such as Z6/105 (Pl. VII, fig. 8) and Z6/486.

Side scrapers:—The flakes which may be put in this category are those which have little or no retouch, but appear to have been used as scrapers along one or both sides (Nos. Z6/106, Z6/456, Z6/96 and Z6/524). This category grades into the concave or hollow group, since re-sharpening or use is apt to produce a concavity. Many of the side scrapers are, in fact, composite tools, for example Z6/237 which has a notch or hollow in addition to the straight cutting edge.

Hollow scrapers:—Hollow scrapers form a large part of the collection and, as in the Clactonian industry, they indicate that the working of wood was practised by early man of Kibbanahalli, though no artifacts of wood have survived here.

In this class of scraper, a large flake has been removed to produce a concavity and then steep retouch within the concavity has strengthened the edge (No. Z6/93, Pl. VII, fig. 7 and Z6/586). In some cases, such as Z6/683 and Z6/433, the retouch appears to be on the bulbar face, although the flake which produced the concavity was taken from the upper side of the scraper. In other cases, the splitting of a pebble by thermal fracture has left a slight concavity and this has been retouched (Z6/433). Another type within this group is the double-hollow scraper (No. Z6/126).

Fabricator:—A fabricator is a tool used for producing secondary working or retouch on stone artifacts. It is often a long, pointed flake convenient for retouching the cutting edges of hand-axes. The specimens placed in this category are rough, and therefore somewhat doubtful. No. Z6/48 (Pl. VII, fig. 9) shows what appears to be bruises caused during the operation of pounding the rough-outs. No. Z6/666 also has the bruises, but is slightly rolled.

Cores:—Kibbanahalli has yielded some remarkable cores. The ordinary "Clactonian" cores from which the large flakes were struck are not in the collection, but they must have been part of the industry. The aberrant cores suggest techniques of striking blades which would be surprising in a Lower Palaeolithic context (Z6/122, Z6/133; Pl. VII, figs. 11, 10). They are large editions of the cores common in much later microlithic industries.

The blades struck from them, however, are not represented in the collection. One is, therefore, left with the problem whether blades are part and parcel of the Kibbanahalli industry or whether there is a later blade industry to be found at that locality in addition to the Lower Palaeolithic one, of which the cores only have so far been found.

The most interesting core is Z6/122 which is a conical blade-flake core. It is a proto-type of the conical blade-cores of microlithic industries. It is about 5 ins. long and has had six or seven flakes removed. Z6/503 is another, from which four flakes have been removed.

That some of the large, thick flakes were also used as cores at Kibbanahalli is exemplified by Z6/2. It is a thick flake, about 7 ins. long, from which a flake of about 4 ins. long and 3 ins. broad has been detached.

Nyamati. No. 224 (Pl. XI, fig. 7). Bifacial asymmetrical cleaver-like pebble tool with rounded working edge. Working edge approximately semi-circular, the opposite end being formed by unworked part of the pebble which includes a natural flat base on which it is possible to stand the specimen upright. L.—about 7 cm. W.—about 8 cm. Material quartzite.

No. 225. (Pl. IX, fig. 11). Bifacial pebble tool with a pointed working edge. Flaking appears to be free with very little secondary working. A large part of the original pebble, which is flattish, is unworked on the underside of the implement. Functionally, the specimen may be regarded as a hand-axe. L.—about 9 cm. W.—about 8 cm. Material—quartzite.

Kadur. No. 226. (Pl. IX, fig. 5). Pointed hand-axe, worked bifacially. Portion of the original pebble-surface left unworked on the butt portion. Typologically Abbevillian, though such specimens are known to occur in India up to the Late Acheulian. L.—about 8 cm. W.—about 6 cm. Material—quartzite.

Nidaghatta. No. 209. (Pl. X, fig. 4). Bifacially worked disc. Coarse free flaking all round, about six flakes having been taken off on each side. Cutting edges fairly straight. Some part of the original pebble surface is left in the middle of the sides. L.—about 9 cm. W.—about 8 cm. Material—quartzite.

No. 210. (Pl. XI, fig. 1). Small polyhedric disc. Worked on both sides. Bold free alternate flaking, five or six flakes having been taken off on each side. Cutting edge zig-zag. L.—about 7 cm. W.—about 6 cm. Material—quartzite.

No. 211. (Pl. VIII, fig. 1). Beautifully-made symmetrical hand-axe with a rounded apex and a slightly zig-zag cutting edge. Displays good secondary step-flaking. Retains a small portion of the original pebble surface on both sides. Has a flat butt due to an original cleavage plane of the rock. L.—7.5 cm. W.—6 cm. Material—quartzite.

Lingadahalli. No. 212. (Pl. X, fig. 7). Pointed hand-axe. Like 211, has a flat butt and displays zig-zag cutting edge produced by bold alternate flaking. Tip broken off. Typologically, it might be classed as Abbevillian, but Acheulian rough-outs are of the same kind. L.—8 cm. W.—about 6 cm. Material—quartzite.

No. 213. (Pl. VIII, fig. 8). Subovate hand-axe, probably worked bifacially. Difficult to make out the flake scars since the material is white quartz. Cleavage planes of the rock have been taken advantage of in

shaping this specimen. The butt end is more or less straight. L.— about 8 cm. W.—6.5 cm.

No. 214. (Pl. IX, fig. 9). Small asymmetrical hand-axe, worked on both faces. Bold alternate flaking has produced the zig-zag cutting edge. The butt retains considerable portion of the original pebble surface. Typologically, this specimen would be classified as Abbevillian in Europe. L.—6.5 cm. W.—6 cm. Material—quartzite.

No. 215. (Pl. VIII, fig. 9). Irregular ovate, bifacially worked. One end more flattened than the other, which may be regarded as the butt. L.—11 cm. W.—about 8 cm. Material—white vein-quartz.

No. 216. (Pl. VIII, fig. 10). Finely pointed hand-axe made from a thick flake. Some secondary work (step flaking) is present after free flaking was used in order to straighten the edges. This suggests an Acheulian rather than Abbevillian technique. The two sides are different, one being made up in part of the primary flake surface. But at right angles to the bifacial plane, this implement is almost symmetrical. Flaking coarse, but the edges are straight. L.—about 8 cm. W.—5.5 cm. Material—quartzite.

No. 217. (Pl. VIII, fig. 3). Like No. 216 it is a pointed bifacially worked hand-axe though it is pronouncedly asymmetrical. Part of the original surface is still present. Free flaking with zig-zag edge. Secondary step-flaking negligible. Butt end wedge-like, almost pointed. L.—about 9 cm. W.—about 5 cm. Material—quartz.

No. 218. (Pl. X, fig. 9). Several large flakes were taken off to make the upper face of this tool. Since the underface is plain, except for two smaller flake scars, the implement may be classified as a chopper according to the definition of Movius (1949b). Owing to rolling, secondary working is not discernible, but it is clear that the tool was made from a heavy flake. The flake was a Clactonian one, using a pre-existing joint surface as striking platform. This specimen shows that " choppers " are not always core tools. L.—8.5 cm. W.—6.5 cm. Material—quartzite.

No. 219. (Pl. VIII, fig. 4). Suboval hand-axe made on a pebble. The under face is almost flat. Point produced by rough bilateral flaking. About half the implement still covered with original pebble surface. Somewhat worn. This specimen is of the " Abbevillian " type. L.—7 cm. W.—4 cm. Material—quartzite.

No. 220. (Pl. VIII, fig. 5). Small hand-axe on a flat flake with rounded point. That the flake was struck at a high angle, Clactonian fashion, is shown by the cone of percussion. This specimen may alternatively be regarded as an abnormal cleaver, for the following reasons. Its cross-section is a parallelogram, the flaking of both upper and undersides being confined to the left margin. The lower edge (presumed cutting edge of the cleaver) is flaked on the upper side only. It is, however, not so straight as it should be in a cleaver. The upper end is flattened by one flake scar, on the upper side, giving it a duck-bill shape. Perhaps this was a dual-purpose tool which could be used as a cleaver or as a hand-axe. L.—about 7 cm. W.—5 cm. Material—quartzite.

No. 221. (Pl. X, fig. 11). Polyhedric ovate, with zig-zag cutting edge. Upper side pyramidally raised. There is a short, cutting-edge produced by a flake scar on the upper side and a joint surface on the lower. It is

a core tool and resembles the "chopping-tools" of Movius. L.—6.5 cm. W.—5 cm Material—quartzite.

No. 222. (Pl. IX, fig. 1). Disc-like "chopping-tool." Sub-circular bifacially worked, but with a "butt" portion left flat. Step-flaking present but probably due to the effect of the bedding-planes. Hence there is no evidence of the step-flaking being intentional. L.—8.5 cm. W.—7.5 cm. Material—banded quartzite.

No. 223. (Pl. XI, fig. 5). Fine asymmetrical ovate, made on a flake. It has a long striking platform of 5 cm. and most of the underside consists of the flake surface. That the flake was struck in the Levalloisian fashion is shown by the right angle position of the striking platform to the axis of the implement. The bulb of percussion is still present. The edge opposite the striking platform is bifacially flaked to form a zig-zag edge. Functionally a chopper or a cleaver, but cutting-edge irregular and not continued all the way round. Whether the tip is significant cannot be decided. L.—7.5 cm. W.—6 cm. Material—quartzite.

Jyankal. No. 207. (Pl. VIII, fig. 2). Pointed asymmetrical hand-axe. Shape greatly influenced by cleavage of the rock. Edges flaked from both sides. Tip rounded. L.—8 cm. W.—about 6 cm. Material—quartzite.

No. 208. (Pl. VIII, fig. 6). Semi-circular "chopper," on coarse flake. Cutting edge worked only on one face. Butt-end a straight jointing plane of the rock. L.—about 8 cm. W.—about 9 cm. Material—banded quartzite.

Jodi Katte. No. 203. (Pl. XI, fig. 3). Asymmetrical short duck-bill hand-axe of sub-oval shape, made on a flake. Shows flaking round the edge, mainly on upper side. L.—about 7 cm. W.—about 6 cm. Material—quartzite.

Talya. No. 204. (Pl. IX, fig. 3). Round-pointed asymmetrical hand-axe. The bold alternate flaking has produced a sinuous edge. Large portions of original surface left on both sides, possibly made from a pebble. It is noteworthy that the butt-end has been made narrow by flaking from both sides. L.—about 9 cm. W.—about 6 cm. Material—quartzite.

No. 205. (Pl. X, fig. 1). Ovate of fine workmanship. Nearly symmetrical. Although the implement is worked all over on both sides, one face retains a portion of the original surface. On the opposite side, a large scar suggests that part of the surface was lost owing to a natural accident after completion of the tool. This is possibly an insolation fracture. L.—about 11 cm. W.—8.5 cm. Material—quartzite.

No. 206. (Pl. IX, fig. 7). Irregular. Difficult to study the working on the implement owing to the bedding planes producing the effect of step-flaking. Worked on both faces all round. L.—about 8.5 cm. W.—6.5 cm. Material—banded quartzite, same as No. 222 from Lingadahalli.

Karadigudda. No. 202. (Pl. VIII, fig. 7). Irregular ovate, worked all the way round on both sides. The upper right margin of the upper side has a concave "bay" produced by a flake struck from the underside. It cannot be decided whether this was intentional or is an accident. L.—about 8 cm. W.—about 5.5 cm. Material—white vein-quartz.

Ranganathpur. Z6/441. Geological Museum, Central College, Bangalore. Appears to be a rough hand-axe. It has been considered as a new type

(Sripada Rao, 1930) because it is supposed to contain two small ledge-like notches suitable for hafting. In a poor raw material like quartz, it is not admissible to consider these notches as intentional. This specimen resembles No. 213 of the Madras Museum. L.—about 9 cm. W.—about 7 cm. Thickness—about 3.3 cm.

D. TYPOLOGICAL COMPARISON OF THE MYSORE PALAEOLITHIC INDUSTRIES WITH THOSE FROM OTHER PARTS OF INDIA.

The typological position of the Mysore Palaeolithic industries cannot at present be fully assessed. Kibbanahalli has produced a larger collection of artifacts than any other Mysore site so far investigated. But it is not the magnitude of the site as compared with other Mysore sites which affects the problem of correlation, so much as the complicated nature of the industry itself. Together with the usual assemblage of South Indian Palaeolithic artifacts, there occur at Kibbanahalli a number of beaked tools and Clactonian types, which are apparently alien to the Lower Palaeolithic industries of neighbouring regions. Further investigation of these regions, which might reveal comparable industries elsewhere, is required before the question of the position of Kibbanahalli, and therefore also of Mysore itself can be finally assessed.

Apart from the aspects of the Kibbanahalli industry mentioned above, it is possible to treat the Mysore material as a unit, although it comes from a number of different sites. This is due to its remarkably uniform character, expressed mainly by primitive shapes and the rarity of Late Acheulian specimens. The number of artifacts (except those from Kibbanahalli) so far collected is too small to give a final verdict. Considering, however, that occasional collecting usually produces the more elaborate types of tools, simply because they are more conspicuous and more easily found, it is justifiable to say that a late Lower Palaeolithic industry appears to be lacking in Mysore. This statement can be substantiated by a comparison of the Mysore specimens with the industries found at Attirampakkam, Chingleput District, Madras Province. These industries have been studied by Krishnaswami (1938a). The sites were visited by the writer with Professor Zeuner's expedition in 1949, and there is a clear geological sequence available into which successively more evolved industries have been fitted. The material has been studied in an endeavour to determine the typological stage to which the Mysore material might point. The results of these comparative studies are given in the following paragraphs and illustrated in the Plates.

Before the present attempt was made, Sankalia (1946) had already drawn some parallels between his Gujarat material and specimens from Mysore. He had compared:

Sankalia's No.	Locality	Foote's No.	Mysore Locality
230	Pedhamli III	with 202	Karadigudda
50	Pedhamli III	with 205	Talya
132	Pedhamli II }	with 216	Singadalli
244	Aglod }		
No number	Pedhamli	with 209	Nidaghatta

Sankalia's comparison would indicate that specimens comparable with the Acheulian industry of Gujarat occur in Mysore. The Gujarat industry (see page 13) belongs to the Acheulian complex. In view of its Soan affinities however, it is advisable from the present point of view to confine the comparison to the nearest available sequence of Palaeolithic industries, that of Attirampakkam.

The Mysore Palaeolithic comprises tools made from pebbles, as well as pieces of solid rock. Quartzite pebbles being abundant in the rivers of Mysore, it is not surprising that pebble tools should occur in this State as they do in Gujarat and Attirampakkam. An interesting feature is the presence of specimens made from vein quartz, a material which is readily obtainable from the quartz dykes of the Basement Complex of Mysore. Owing to the bad fracturing qualities of this material, however, tools made from it are rarely informative from the typological point of view. Another raw material used, a banded quartzite with a tendency to split along the bedding planes, is not known from elsewhere. It is probably derived from the Dharwar Series.

The pebble tools found in Mysore are not of the primitive type illustrated by the specimens from Oldoway in East Africa. The Mysore specimens are flaked in a more or less complex manner and are bifacial. Typologically, therefore, they may be regarded as specimens of an Abbevillian kind of workmanship (excepting No. Z6/50 from Kibbanahalli), although no chronological correlation with the Abbevillian of Europe is implied. In fact, pebble tools of the Oldowan type are quite frequent in the Acheulian of the Sabarmati. Neither the technological stage nor the age of the Mysore Palaeolithic, therefore, is indicated by their presence. In the material from Attirampakkam III and from Chintaladevi (24 miles northwest of Kavali, Nellore District) pebble artifacts occur which are very similar to those of the Mysore area (see Pl. IX, figs. 11 and 12).

A few rostrocarinate-like implements from Kibbanahalli may point to some pre- Abbevillian elements in the Palaeolithic industries of Mysore, although sometimes an unfinished tool may have the appearance of this type of implement. The problem is worthy of further investigation, however.

The pebble tools grade into more or less pointed hand-axes of the ordinary type. Most of these display the zig-zag edge of the Abbevillian technique, and step-flaking deliberately applied to straighten the edge is present only exceptionally (No. 211, No. Z6/510). Of the well-worked hand-axes, Nos. 216 and 217 bear a striking similarity to Attirampakkam III, 51 and AV III, 5 from Vadamambakkam near Arkonam, Madras Province (Pl. VIII, figs. 11 and 12). No. 204 from Talya resembles AT III, 38 (Pl. IX, figs. 3 and 4).

The hand-axes in turn grade into more or less oval, bifacial tools, a few of which may legitimately be called ovates (Nos. Z6/728, Z6/20 and 205). The best specimen is No. 205, which is comparable with European Acheulian ovates. Typologically, it is characterised by flaking which produces a straight, untwisted edge and which leaves one side thicker than the other. Altogether the specimen is thick by European standards, but it must not be forgotten that most of the raw material used in Europe is flint, whilst in India it is mostly quartzite, which is a technically difficult material to work. The straightening of the edge appears to have been achieved by

a certain amount of step-flaking which, for the same reason, is somewhat coarse. In the European classification this specimen would pass for Early or Early-Middle Acheulian. Similar specimens occur in large quantities in the Middle Acheulian of East and South Africa. In south India comparable specimens are found at Vadamambakkam (AV III, 9) and Uliyambakkam (AV VII, 3, see Pl. X, fig. 2).

At Attirampakkam similar specimens occur in phase V, but apparently not in phase III. No. AT V 65 has been illustrated in Pl. X, fig. 3. Finally, specimen No. 205 is comparable with the ovate that Cammiade (see Richards, Cammiade and Burkitt, 1932) found on the left bank of a stream to the west of the Polavaram Taluk in the Godavari District. The ovate from Talya is, from the technological point of view, the most advanced palaeolith so far found in Mysore. In addition to ovates, choppers of the Movius type occur. No. Z6/611 is a fine example. Discs are too numerous to mention. They are of widespread occurrence in India, although they tend to be more frequent in the earlier phases of the hand-axe culture. Of the Mysore specimens, Nos. 206, 209 and 222 can be matched with specimens from Attirampakkam II (AT II, 88, Pl. IX, fig. 2) and from Kilkuppam near Arkonam (AV II 17, Pl. X, fig. 5).

The choppers pass into types of tools which have chopping edges only round a portion of their circumference, leaving at the butt-end a flat " base." This base, however, is usually due to advantage being taken of the presence of a cleavage plane in the rock. Of this group, Nos. 211, 212, 223 and 224 may be mentioned. Similar specimens occur in Attirampakkam III; Nos. 212 and 223, for instance, are comparable with AT III 54 and AT III 191 (Pl. X, fig. 8 and Pl. XI, fig. 6) respectively. From the functional point of view these specimens may be regarded as simple cleavers. They certainly have not the characteristic shape of the cleaver as described by Foote.

There are many true cleavers, particularly from the Kibbanahalli site. They are of many types and Nos. Z6/33, Z6/597 and Z6/504 are carefully finished and may belong to the Attirampakkam V stage. Some of them are earlier and belong possibly to Attirampakkam III. Nos. Z6/665 and Z6/39 show considerable economy of work. No. 220 is another interesting specimen; with its parallelogram cross-section and its tapering outline it is reminiscent of type AB of Krishnaswami (1938a).

To sum up; it is apparent that the Mysore Palàeolithic (as far as the available material suggests at the moment) represents a culture comparable with Attirampakkam III. This culture indeed contains all the types that have so far been found in Mysore. The only exceptions are ovates No. 205 and a few others from Kibbanahalli which might be later.

Kibbanahalli presents certain special characteristics. It includes some very primitive material as well as some specimens of late appearance. Its beaked tools together with the prolific occurrence of the hollow scraper indicate a strong affinity with the Clactonian. This aspect of the Kibbanahalli Palaeolithic industry stands alone and finds no parallel in the rest of Mysore.

Of course, the Mysore material is not all of one age. Nevertheless, the bulk suggests that a culture of the Attirampakkam III type was relatively widespread in Mysore State. More finds will undoubtedly be made in the future and extend the typological range of the Mysore Palaeolithic.

Chapter III

MICROLITHIC INDUSTRIES OF MYSORE

A. INTRODUCTION

It is a curious fact that in the whole of South Asia a true Upper Palaeolithic in the sense of the European sequence has not yet been recovered. In view of the fact that numerous sites have become known both of Lower Palaeolithic and microlithic industries, the least that can be said is that such Upper Palaeolithic industries must be very rare.

It must be admitted that in the late Soan of N.W. India (now Pakistan) a flake element becomes rather prominent, so that it is possible that the hand-axe industries were followed by a period of flake industries based on the Levalloisian technique. But sites with pure and typical industries are still wanting. On the other hand, the oldest industry found by Subba Rao (1948) at Sanganakallu, Bellary District, appears to contain a Levalloisian element. These patinated flakes of trap and sandstone, of which about 400 have been found, are at least in part made from cores prepared in the Levalloisian fashion. This is particularly evident in the case of the short round flakes, which on the upper surfaces clearly show a preparation by flaking from the periphery of the core, prior to the taking off of the flake which it was intended to strike. Similarly the long flakes are struck from cores from which other long flakes had been taken off in the same direction. This might be a variety of Levalloisian technique, as indeed it is wherever the so-called blade-flakes were made by peoples using the prepared-core technique, for instance in Mark Kleeberg (Central Germany), on the Somme (Northern France), in the Mount Carmel caves (Palestine) and elsewhere. Where, however, the raw material is not first-class flint or obsidian, poor, flake-like blades are easily produced from cylindrical or conical blade cores. This possibility applies to the long flakes from Sanganakallu since they are made of trap and sandstone. If this is the case, they are no more than a large facies of the microlithic blades present in the same layer. This alternative has to be regarded seriously, since Subba Rao expressly states that microliths were actually found in association with the flakes under discussion.

A similar occurrence of blade-flakes in association with a microlithic industry is observed also in a collection of implements from Hyderabad made by von Furer-Haimendorf and housed at the Institute of Archaelogy, London. It is composed of surface finds and contains large numbers of rough fluted cores which may be regarded as giant forms of the microlithic cores. With them occur numerous flakes comparable with the Sanganakallu ones and also many microliths. The raw material is jasper and chert, available in large lumps. The age of this industry is unknown; it may have lasted into comparatively recent times.

It is noteworthy that blade-flakes are present at Brahmagiri also, but their association with microliths cannot be established since they have so far been found on the surface only. This will be described on page 34.

This evidence is admittedly scanty, though it leaves one with the impression that the microlithic industries of South India can be derived from a hypothetical Levalloisian flake industry which preceded them.

In this respect, South India would not stand alone, since in North Africa, in the opinion of Professor Vaufrey (1933), the Aterian, a direct descendant of the Levalloisian, passes into microlithic industries such as the Oranian (Ibero-Maurusian). The case is similar in East Africa, where the Levalloisian Stillbay, in turn, passes into the Magosian and Wilton B (Leakey, 1936).

The only element in the South Indian Stone Age which might conceivably be regarded as Upper Palaeolithic is the 'Industry III' of the series of Cammiade and Burkitt (1930) from the Nandikanama Pass and other localities. It is characterised by the presence of "slender blades with blunted backs, a few burins, planing tools and end-scrapers."

It must however be noted that these elements occur in the microlithic industries also. Moreover, the collection figured by Cammiade and Burkitt on their plates V and VI would not be out of place in the Mysore microlithic industries of the Jalahalli group. The fluted cores, crescents and points are particularly striking. So far as evidence goes at the moment, therefore, there is no need to assume the presence of an independent Upper Palaeolithic in Mysore or elsewhere in South India.

Until definite evidence to the contrary is brought forward, the microlithic period must be regarded as an immediate successor to the vast period of industries of Lower Palaeolithic aspect.

B. MICROLITHIC SITES OF INDIA

It is worthwhile noting, as briefly as possible, the several assemblages of microliths discovered in India. It was in 1867-68 that Carlyle(1) began collecting microliths in the caves and rock-shelters of Bundelkhand, Baghelkhand, Rewa and parts of the Kaimur range. Since his discoveries, a large number of other sites have come to light. They have been listed by D. H. Gordon (1938). To this list must be added the Gujarat sites discovered and systematically excavated by Sankalia (1944, 1945 and 1946) and the Godavari sites of Cammiade (1924), more than a hundred in number. Maski in the Raichur District of Hyderabad State, Sawyerpuram, Kulattur and other sites of Tinnevelly District and Todd's (1939) sites round Bombay are the most important found in recent years. Mention must also be made of the Kurnool sites of Cammiade and Burkitt and Patpad of Foote in the same area. Codrington's site of Ellora and the Jabbalpur sites of Gordon are of potential importance since they have produced rare types of implements which I have been able to examine in the collection of the Institute of Archaeology, London.

The recorded sites thus extend from Karachi (Pakistan) on the west to Seraikala in Bihar in the east and from Jamalgarhi (Pakistan) in the north to Tinnevelly in the south.

(1) Specimens of his collection are found in the British Museum, London, and Pitt-rivers Museum, Oxford, where I have been able to examine them, and in the National Museum, Dublin V. A. Smith (1906) published a short paper on them.

C. MICROLITHIC SITES OF MYSORE

A systematic search for microlithic sites in Mysore State is likely to lead to the discovery of many more localities than are known at present. As early as 1895 Bruce Foote, who then was Mysore State geologist had discovered in many places cores of chert and chalcedony together with some worked flakes. French Rocks near Seringapatam yielded a few cores. Near the Travellers' Bungalow at Hiriyur, Chitaldrug District three flakes were picked up by chance. A worked flake of dark chert came from Kaldurgahill in the Tarikere Taluk. A thick, triangular flake of chert and a core of Lydian stone were found at Holakal Hill in the Sira Taluk by Sambasiva Iyer of the Geological Survey of Mysore. Kinciad Lee found a few flakes and cores on the race course at Bangalore, and in 1896 he found a number of flakes and cores on Minakshayya's estate, south-east of Tumkur. Recently D. H. Gordon (1945) discovered two sites near Bangalore. Apart from finished implements which are rare, a considerable quantity of cores and flakes has been recovered from these sites.[1] There is no doubt, therefore, that they are manufacturing sites. One of the sites is on a bare piece of rising ground to the North of the road which leads to the Hindustan Aircraft factory at a point five and a half miles outside Bangalore. The second site lies about a mile and a half to the south of the Sarjapur road between the ninth and tenth milestones from Bangalore. This locality also is a low bare hill which dominates the whole neighbourhood. Owing to the refractory nature of quartz, the sole raw material of these two sites, there is, of course, a high percentage of failures. A few flakes also occur on the surface at Siddapura and Jeting-arameshwara, which are in the neighbourhood of Brahmagiri.

Apart from these stray discoveries, a few sites in Mysore State (Pl. III) have produced large numbers of microliths. One of these is Jalahalli, about ten miles north-west of Bangalore and one and a half miles from Yesvantpur Railway Station on the metre-gauge line to Poona; another is Brahmagiri, in the Chitaldrug District, famous for its Asokan rock edict; and the third is Kibbanahalli, Tumkur District.

At Jalahalli, close to 137 Indo-British General Hospital compound, two wedge-shaped granite hils are seen; the nearer hill rising to the west, the other, rising to the south. Between the two hills runs a narrow valley about a quarter of a mile wide. According to Todd, who described this site (1948, p. 27), the granite hills in places contain intrusive veins of milky quartz and rock crystal.

On the surface of the nearer hill Mr. Todd discovered in November, 1946, flakes and implements of microlithic type. The farther hill, which was being quarried for granite to be chiselled into slabs, had had the weathering soil cut away and removed. Below this black soil, there is in places a reddish soil horizon described by Todd as "pellety laterite." If it were a true laterite, the contained microliths, being made of quartz, would have perished. It is evident, therefore, that this horizon is of a colluvial nature, containing "lateritic" pellets formed elsewhere and mixed with decomposed fragments of local granite. The microlithic industry found here is similar

(1) The implements from these two sites and also those from Dharwar, Belgaum, Chandargi Piranwadi, Jabbalpur, Mohenjo-daro and Dighi Hill near Poona, forming his collection are housed at the Institute of Archaeology Grateful thanks are due to Col Gordon for valuable information about these sites

to the one found on the nearer hill. The implementiferous horizon is from 18 inches to 5 feet below the surface and in all cases lies either on the granite (the parent rock) or on the " lateritic " deposit.

The implements therefore occur sometimes on and sometimes in the red layer, which consists of a rubble of decomposed granite fragments mixed with limonite pellets and is fairly firmly cemented. Some of the microliths had dropped into the large cracks and fissures of the parent rock, where they are to be found.

As regards raw material, it is interesting to note that all the implements were exclusively made from quartz and rock-crystal. In this respect, they closely resemble the artifacts from Calient in the Madras Presidency and Bandarewela in Ceylon, which I have been able to study both in the British Museum and in Oxford. Out of the whole Todd Collection of implements from Jalahalli now in the British Museum, only one is of red jasper. Quartz being a difficult raw material, the evidence for the flaking and the retouch on the implements is not easily detectable, but those made of rock-crystal display beautiful workmanship.

Brahmagiri is a granite outcrop rising some 600 ft. above the plain in the Molakalmuru Taluk of the Chitaldrug District in the northern extremity of Mysore State. It sprang into great importance in Indian archaeology as a result of the discovery of three copies of Asoka's rock-edict No. 1. This find led to the conclusion that the northern portion of Mysore formed the most southerly known point of the great empire of the Mauryas. The mention of the town of ' Isila ' in the rock-edict, led to a deliberate search. The town-site was eventually identified, lying at the foot of the Brahmagiri hills. With a view to uncovering the Mauryan town, trial excavations were carried out by Dr. Krishna of the Mysore Archaeological Survey in 1940 and 1942 and, the great potentialities of the site being amply confirmed, careful excavations were undertaken by Dr. Wheeler on behalf of the Government of India in 1947.

The northern slopes of Brahmagiri are largely covered by a tumbled mass of granite boulders. There are extensive signs of ancient occupation in the form of potsherds, fragmentary walls and remains of small terraced platforms roughly revetted by dry-stone walling. It is to be presumed that 2000 years ago there was more earth amongst the boulders than remains at present and that much evidence of this part of ' Isila ' has been washed away. The main area of occupation must have lain, as surface remains and excavation combine to indicate, along the gentle slope which now forms the transition from the hill to the plain. In the midst of the zone of occupation stands the great boulder which bears on its upper surface the best-preserved of the three copies of the edict. A furlong to the south-east, up the hillside, there is a small brick-chaitya, a sadly ruined structure but nevertheless the best preserved monument of Isila.

In order to fit the microlithic industries into this picture of the site of Brahmagiri, it is necessary to summarise briefly the results of the Brahmagiri excavations, a work which was carried out with thoroughness and accuracy.

Of the three cultures revealed on the occupation-site, phase " B " of the earliest, the Stone Axe culture, is of importance since 80 out of 102 microlithic blades and implements have been recovered from its layers. The

preceding phase " A " of the same culture has produced only 9 specimens The Megalithic culture which succeeds the Stone Axe culture, has also yielded some microliths from its layers, though no more than 9 specimens. The chronological position of the microlithic culture of Brahmagiri is thus fixed. It would appear that the microlithic culture had its beginnings in phase A of the polished Stone Axe culture and survived into the Megalithic. Its fullest development was obviously during the " B " phase. In fact, it would be worth while to test by further excavation the question whether the microliths found in " A " below, and in the megalithic level above, are truly *in situ*, or whether earth-movements or burrowing animals had translocated them. As regards the four specimens found in the upper strata, the Andhra culture level, translocation must be considered virtually certain.

From a study of the artifacts, another important point emerges, namely that jasper is the most frequent among the raw materials used in the making of the microlithic implements. Obviously it was highly prized, perhaps because of its colour and attractiveness. Furthermore, excellent supplies could be procured only 10 to 15 miles away, namely 3 miles north of Sandur town among the Sandur hills, and also from the beautiful cliffs of Ubbalgondi, a village 7 miles east south-east of Sandur (Foote, 1895, p.203).

Along with jasper, rock-crystal, carnelian, agate, flint and common opal occur as raw materials. These and other raw materials such as chert are available in the district, a fact which renders intentional selection of the coloured jasper highly probable.

The site of Kibbanahalli, which is remarkable for its Palaeolithic artifacts (see p 16) has also produced a microlithic industry. From an examination of the waste material, it appears to be a factory site too. The site was discovered by Mr. and Mrs. Allchin, of London University, who visited that area in 1951 in the hope of finding palaeolithic artifacts. There are a number of small spurs extending towards the cultivated lands of the village of Kibbanahalli. The implements and the waste material all came from these spurs.

D. CLASSIFICATION OF MICROLITHIC INDUSTRIES FROM MYSORE

Bangalore (1): Jalahalli.

The Jalahalli industry must be regarded as truly microlithic, since the majority of the pieces is smaller than 2 cm. The maximum length for lunates is only 18 mm. and the minimum 9 mm. for those found *in situ* at the quarry hill, and 20 mm. and 9 mm. respectively for the surface site. The maximum length of pointed flakes blunted on one side or part of one side is 22 mm. in the surface site, and 20 mm. in those found *in situ.* Generally speaking, the size of the implements, as Gordon (1938) suggests, largely depends upon the raw material, which is mainly quartz.

In spite of their small size, the implements are remarkably varied in type. From a close examination[1] of the specimens in the British Museum

(1) Grateful thanks are due to Mr Alexander and other authorities of the British Museum for giving me all facilities to study Todd's Collection of microliths from Jalahalli The whole assemblage has been studied in detail in order to elucidate the character of the industry.

it is evident that the proportion of worked specimens to unretouched flakes is unusually high. About 75% are retouched flakes. There are six cores varying from 1 cm. to 3 cm. in length, made of quartz and rock-crystal. The majority of the cores from the Bangalore sites are pointed (or "conical"), though cylindrical and conical flat-based cores and chisel-ended cores are also present. The pointed and chisel-ended cores are of course nothing else but finished specimens derived from conical flat-based originals, whilst the rare cylindrical cores represent a different type. The presence of thin, long blades shows that fluting, though difficult on quartz, was practised with considerable success. It should be noted, however, that larger cores from which flakes were taken must have formed part of the Jallahalli assemblage. None of these has been included in the collection. Perhaps they were overlooked by the collector.

Points:—The characteristic tool of the series is an asymmetrical point with a wholly blunted back. Of the total number of 39, 25 are obliquely blunted on the left; 14 on the right. One of these (Pl. XIII, fig. 51) is worth noting because it is the only specimen made of red jasper and also shows signs of use (Todd, 1948, fig. 2, No. 29). One point deserves special mention. It is made of rock-crystal, obliquely blunted on the right, and may be compared with No. 23 of Fig. 16 of Clark (1936). No. 33 (Todd) has steep retouch and has been blunted obliquely on the left (Pl. XIII, fig. 26). No. 50 and No. 51 (Todd) are about 3 cm. long, blunted on the right, and form the largest blades of the whole assemblage (Pl. XIII, figs. 64, 65). It is interesting to note that there is a round-based point present (Pl. XIII, fig. 18) and a small curved point of rock-crystal (Pl. XIII, fig. 33) which is very like those called "Frensham" points in southern England. Such points have been found at Spreakley and Bron-y-De on the surface and at Kettlebury in excavation (Rankine 1951).

There are some rod-like artifacts with a triangular or polygonal cross-section. They are about a centimetre long and are probably just spalls since they show no secondary working. One of them, however, appears to have been retouched and probably used as a drill.

Nos. 42, 43, 44 (see Pl. XIII, figs. 47, 27, 49) and 45 (Todd) probably fall into the category of drills. No. 44 is of particular interest since it has been finely blunted on both sides.

Triangles:—There are five triangles and two scalenes (Pl. XIII, figs. 56, 58) in the collection. Nos. 27, 28 and 38 (Todd) are asymmetrical triangles of rock-crystal and show fine retouch (Pl. XIII, figs. 52, 53, 54).

Lunates:—Next, the lunates constitute the most conspicuous group of the assemblage. Todd notes that they form 38.7% and 32.4% of the artifacts from the quarry hill and the surface respectively. Practically none of the lunates shows any signs of a bulb of percussion.

Lunates or crescents may be divided into two varieties. In the one the chord is blunted, in the other, the arc. The majority of the lunates belong to the latter category (see Pl. XIVB). No. 25 (Todd) has the chord edge trimmed, in addition to the blunt edge of the arc (Pl. XIVB, fig. 4). Many of the lunates are asymmetrical, and approach the blunted-back point.

Petits tranchets:—No fewer than nine petits tranchets have been found at Jalahalli and constitute a characteristic type of this industry. The "petit

tranchet" (English equivalent 'transverse arrowhead' (Clark, 1932, p.xxi)) consists of a section of a flake with steeply blunted sides. Jalahalli, No. 7 (Todd) deserves to be specially noted as a good example (Pl. XIII, fig. 2). On the whole, the transverse arrowhead occurs very rarely on Indian sites. Only one other specimen so far has been published, namely by Bruce Foote (1916, Pl. 14, No. 43). It was found at the teri site of Sawyerpuram in the Tinnevelly District. There are, however, a few more specimens in the recent collection made by Mr. Lal and Mr. V. D. Krishnaswami from various sites in the Tinnevelly District.

Burins:—The hall-mark of the burin, a pointed flake, or less commonly a core tool, is the burin facet which is produced by a blow struck at the working point along the length of the flint, the blow truncating the edge of the blade or flake (Burkitt, 1920, pp. 306-310; Clark, 1932 and 1936; Noone, 1934; and Garrod and Bate, 1937, Pls. IX, XVI, XVII, XVIII, XX, and XXIII). Though the burin is one of the most characteristic types of the Upper Palaeolithic of Europe, it is sometimes abundant in the Mesolithic. At Star Carr, Yorkshire, for instance, it is the most frequent tool-type that can be recognised.

The Jalahalli assemblage comprises five burins, three of quartz and two of rock-crystal. The rock crystal specimens are very small and measure 13 mm. and 10 mm. respectively (Pl. XIII, figs. 60, 61). It must be noted that burins of quartz are not so obvious as those of flint or agate owing to the less regular surfaces of the flake scars. The rock-crystal specimens belong to the 'J' type and 'L' type of Noone (1934) respectively, and the quartz burins to the 'A' type (Bec-de-flute). Two of them were figured by Todd (1948, fig. 2, Nos. 52, 53; see Pl. XIII, figs 63, 59 in the present publication).

Scrapers:—Many types of scrapers are present among the Jalahalli implements. There are ten end scrapers (including Todd's Nos. 54 and 58; see Pl. XIVA, fig. 13) and six side scrapers. Three of the side scrapers (Pl. XIVA, figs. 10, 11, 16) are longer than broad, finely retouched on one side, which is slightly curved. The remaining three are simple thumb-nail scrapers (Pl. XIVA, figs. 2, 4, 7). Only two nose scrapers are present in the collection (Pl. XIVA, figs. 15, 17).

Flakes:—Of the numerous flakes, hardly any show marks of utilisation. The largest flake is 5.25 cm. long. It is thick and heavy and has a prominent bulb of percussion. It is made of vein quartz and shows no further signs of retouch or use.

Bangalore Sites: (2) and (3)

A few words should be added about the implements from the other two sites near Bangalore. The artifacts from the Hindustan Aircraft factory site (site 2) are not representative since the number of implements is only 17. Though observations on such a small assemblage are liable to be misleading, the group appears to have some resemblance to the Jalahalli series. In the first place points are present in both in large numbers (some blunted on the right, others on the left). Of the implements from the Aircraft factory site, 3 are blunted on the left, 2 on the right. The presence of a drill in the series reminds one of Jalahalli once again. Lastly, the 12 lunates from this collection (see Pl. XV, figs. 20 - 30), over 75%

of the number of the implements (not counting the cores), bear a close resemblance to those of Jalahalli. There is, so far as evidence goes at the present, no objection to the assumption that the same culture is found at the Hindustan Aircraft factory site as at Jalahalli.

The last site (site 3) lies near the Bangalore - Sarjapur road. It appears to be a good manufacturing site. In addition to the presence of a large number of primary flakes, there are a few cores, parts of cores and core rejuvenation flakes.

A finely retouched tanged arrowhead (Pl. XV, fig. 14) is conspicuous among the implements from this site. It is a good specimen, made of chert. Pl. XV, fig. 1 shows a large, thick point, probably an arrowhead. There are blunted-back points, of which Pl. XV, fig. 5 is a very good example, which has been blunted obliquely on the left all along the edge. The bulb of percussion has been removed carefully. Pl. XV, fig. 8 belongs to the same category. It has very good steep retouch, although the material used is quartz. Another one is retouched on both sides at the point and may have been a drill (Pl. XV, fig. 3). Three others have been blunted obliquely on the right, along the whole edge.

There are two blunted-back "knife" blades in the collection. One of them is a large blade-flake with the bulb of percussion still present. The other one is a fragment only of a blade, of which one side is retouched steeply and the other trimmed lightly.

Of the 15 scrapers, 6 specimens are end scrapers. Some good examples of end scrapers or blades are included among the remainder. Three steep-edged scrapers, which may be small editions of the keeled scraper deserve special mention (Pl. XVI, figs. 8, 9, 10). The rest are side scrapers or flakes with steep retouch along a curved edge. Some are longer than broad, but others approach the thumb-nail type. These side-scrapers are characteristic of the Bangalore industries.

Only three crescents (Pl. XV, figs. 17, 18, 19) and an irregular triangle (Pl. XV, fig. 2) are present and their number is very small compared with the total number of implements from the site.

This industry cannot easily be distinguished from those of the other Bangalore sites and it would be unwise to attempt to separate them on typological grounds. Moreover, the raw material and the *[illegible] physique* are the same. They may therefore be regarded as a unit, at least for the time being.

(4) Brahmagiri

No cores were found *in situ* at Brahmagiri. Dr. Krishna's excavation produced none, neither did Dr. Wheeler's in 1947. But seven cores have been found on the surface. Of these two are of rock-crystal, two of jasper, one flat-based (fluted) core of quartz, one small lump of chalcedony and one conical core of banded agate. That Brahmagiri was a chipping floor is proved also by the presence of a very large number of primary blades and flakes and also of core trimmings and core parts struck off in the course of rejuvenation of cores, and found on the surface.

"Brahmagiri pre-I". The Brahmagiri microlithic industry consists of two groups of implements. To the first group belong a few flakes of jasper, chert and flint, found on the surface, and not known yet from the excavation.

Some of them have secondary working and show signs of use (Pl. XVIIA, figs. 6 and 7). Pl. XVIIA, fig. 3 appears to be a scraper. Pl. XVIIA, fig. 4, probably of black chert, is a hollow scraper. Pl. XVIIA, fig. 1 of flint-like chert has marginal trimming. One chalcedony flake may have been an awl. It is difficult to fit such flakes into the industry which occurs in the excavation at Brahmagiri, because they have certain resemblances to the microlithic phase I of Sanganakallu, near Bellary. Most of them are fairly large primary flakes with little retouch and there are very few implements (Subba Rao, 1948, Pl. XIV). It appears, therefore, that this group of surface finds at Brahmagiri may have preceded the IA phase of the polished Stone Axe culture of the Brahmagiri excavation. Furthermore, the evidence for flaking on the spot, described in the preceding paragraph, would have to be assigned to this phase of the microlithic period of Brahmagiri which, for the sake of convenience, may be called "pre-I."

"**Brahmagiri IA, IB.**" The second group is characterised by slender, long blades which are totally different from the first. All the microliths from the excavation belong to this group. Seven types or artifacts of this phase have been distinguished (Wheeler, 1948). These various subdivisions can, however, not always be justified on typological grounds, because there are few retouched implements in the whole assemblage. There are sixty-four primary parallel-sided blades. They are not blunted, though use-marks occur frequently (Pl. XVIIB, figs. 2, 4), and were presumably used as knife-blades. Seven specimens of parallel-sided blades have been assigned to a separate category, because they are slightly curved at one end. This curvature is due, however, to the original shape of the core from which the blades were struck.

A group of retouched implements from Brahmagiri is that of the blunted-back blades. They are not numerous, six specimens only coming from the excavation. One very good specimen was found on the surface (Pl. XVIIB, fig. 6). Three more have the working edge slightly serrated.

A few of the blades are converted into points by a very gradual oblique blunting. They resemble Gravettian points from the Upper Palaeolithic of Europe, though this does not imply any real affinity of the cultures. One good example comes from the surface (Pl. XVIIB, fig. 7). Others have their edges wholly blunted.

No crescents have been found at Brahmagiri, though there is one specimen which may be regarded as a crescentic point or blade. It is wise, therefore, not to state categorically that crescents do not occur, but it is certain that even if there are any, they must be exceedingly rare.

Two specimens have been classified as 'gravers' (Wheeler, 1948, Fig. 34, Nos 31, 32) but close examination shows that their shape is due to chance. There is no clean break in the one which would constitute the burin facet. Nor does the facet show any bruise or mark of use. The other is a beaked blade such as occur occasionally owing to irregularities in the raw material. In fact, burins are entirely absent from the Brahmagiri microlithic collections.

This is a characteristic feature of Brahmagiri. If one accepts the industry as an ordinary microlithic one, one would expect to find burins (as well as crescents and triangles). This is illustrated by the proportions of burins to microliths in some of the European sites, which are as follows:—

(1)	Abinger Common	1:49
(2)	Farnham	1:26.5
(3)	Selmeston	1:40

But at the Maglemosian site of Star Carr, in Yorkshire, Clark found a quantity of burins which considerably outnumbered microliths. The nature of the site, which is a fishing settlement with numerous antler harpoons made with the aid of the burins, possibly explains this preponderance. The absence of the burin at Brahmagiri, therefore, may be interpreted as meaning that bone or wood was not worked there to any large extent.

Nos. 25 and 26 (Wheeler, 1948, fig. 34) were regarded as triangles in the excavation report, but they appear to be pointed blades without any retouch. No. 26 may have been used. Finally, the class of chisel-ended blades (type VI), with Nos. 33 and 34 (Wheeler, 1948, fig. 34) as examples, has not much to recommend itself. They are mere primary blades from which a short terminal flake has been removed by accident.

The vast majority of artifacts therefore consists of simple blades with little and sometimes no secondary working. Burins, triangles and crescents are absent. On the whole, Brahmagiri suffers from a dearth of specialised implements and therefore must be regarded as a very simple, non-geometric, industry based on small parallel-sided blades. Simplicity, however, does not mean that the industry is primitive, it may well be the result of secondary simplification.

(5) **Kibbanahalli.**

The Kibbanahalli microlithic industry consists almost entirely of quartz cores which are mostly blade cores (Pl. XVIII, figs. 1, 2), though flake cores are present. Some of the large flakes have been slightly retouched and used as side scrapers (Pl. XVIII, fig. 8). Other flakes which are small have also been used, a few possibly as transverse arrowheads (Pl. XVIII, fig. 3).

There is an interesting series of blades, some of which have been used as such; a few have been backed and three have been transversely broken with retouched ends. Some of the blades are tanged also (Pl. XVIII, fig. 5).

In addition to the side scrapers already mentioned, there are a few specimens of hollow (Pl. XVIII, fig. 7), double hollow and end scrapers.

But the most finished artifacts of the whole assemblage are the lunates (Pl. XVIII, figs. 12, 14, 15, 16). Of the five lunates, none has the chord trimmed. A sixth specimen may be regarded as a trapeze (Pl. XVIII, fig. 13). There is only one poor specimen of an obliquely retouched point. Of the 128 specimens found at this site, 44 are unused and unworked flakes and fragments and 84 are used and worked, including finished implements.

E. DIFFERENCES BETWEEN THE JALAHALLI AND BRAHMAGIRI INDUSTRIES

It is pertinent to note certain salient differences between the Brahmagiri and the Jalahalli industries respectively. Even a superficial inspection makes it evident that both implement types and technique of producing them are strikingly dissimilar. Crescents, burins, triangles and transverse arrowheads,

all with steep retouch, characterise the Jalahalli industry. Such types are so far totally absent from the Brahmagiri series where, moreover, the retouch is rarely steep, but usually nibbled. On the other hand, Jalahalli has not produced the blunted-back and serrated blades, which are so common in Brahmagiri IA and IB. In addition, large numbers of parallel-sided unretouched blades 2 inches long have been found. These are reminiscent of the long, slender blades of Harappa and Mohenjo-daro. Brahmagiri, like Mohenjo-daro, represents a semi-urban culture in which arrowheads, crescents and other parts of the hunting equipment are absent, whilst the long knife-blade, presumably a good and cheap kitchen-tool, remains as almost the only piece of equipment made of unpolished stone. These microlithic blades were in all likelihood supplemented by copper tools. A copper chisel was actually found *in situ* in the microlithic layer of the IB culture, in Dr. Wheeler's excavation. Previously, Dr. Krishna (1942a) had found a tool made of copper in the level of the Stone Axe culture. A few other metal objects are known in addition to these.

The Jalahalli microlithic industry, however, with its preponderence of crescents, points and arrowbarbs is ideally suited to a hunting economy and environment.

F. DIFFERENCES BETWEEN THE JALAHALLI AND KIBBANAHALLI INDUSTRIES

Certain differences can be noted between the Jalahalli and Kibbanahalli industries. The presence of microburins, which may be regarded as a waste product, is not significant. The absence of the burin in the Kibbanahalli industry should be regarded as a differentiating feature. Furthermore, the Kibbanahalli industry is characterised by the absence of asymmetrical backed points.

Tentatively, therefore, the Kibbanahalli microlithic industry is classified as a third group, apart from the Jalahalli and Brahmagiri I industries. Whether this new group can be separated from Brahmagiri Pre-I cannot be decided until more collections have been made at Brahmagiri.

G. COMPARABLE SITES OUTSIDE MYSORE

In order to arrive at a clearer understanding of the Mysore microlithic industries than is possible with the aid of the material found within the State boundaries, a number of other sites have been studied.

Sawyerpuram. The "Teri"[(1)] sites, including Sawyerpuram (Tinnevelly district) are among the most interesting factory sites of the microlithic group. Foote (1916) collected 71 chert and quartz flakes and cores from Sawyerpuram. Reference has already been made to a transverse arrowhead from this collection. Aiyappan (1945b) visited the site in 1942 and obtained a further 85 implements, apart from a large number of waste flakes of various sizes. In 1949, more artifacts were collected during Professor Zeuner's

(1) "Teri," a Tamil word, means sand dune The site is covered with fine wind-blown red sand

expedition. Another series from this and other neighbouring sites was collected recently by Mr. B. B. Lal and Mr. V. D. Krishnaswami.(1)

There is some general similarity in the type-tools of Sawyerpuram and Jalahalli. Blades, burins, transverse arrowheads, and crescents are found in both. In both, some of the crescents have trimming on the chord as well as retouch on the arc. In spite of these common features, the two industries need not be identical and contemporary. But it appears safe to say that they are more closely related to each other than is either to Brahmagiri.

Bandarawela. The large series of implements from Bandarawela in Ceylon may be grouped with the Jalahalli industry in the widest sense. This at any rate was Todd's impression when he reported on the latter locality (1948). The present writer has been able to study the Bandarawela material in the collections of the Pitt-Rivers Museum, Oxford, and the British Museum, London, as well as the Jalahalli material. The resemblance noticed by Todd is caused largely by the absence of long blades in both industries. Beyond this, however, some differences are noticeable. The Bandarawela series, for instance, contains no screw-driver type of burin. On the other hand, there are composite tools in the Bandarawela industry (N. A. Noone and H. V. V. Noone, 1940), some specimens bearing more than one working edge. Its range of tools is far greater and types are more varied (60 types and varieties are distinguished).

On the grounds of raw material Jalahalli and Bandarawela are related. In both, quartz is used instead of the usual chert or chalcedony. At Bandarawela, the raw material is almost exclusively rock-crystal, whilst at Jalahalli, common quartz predominates, though rock-crystal is not absent. In brief, these two industries both belong to the " hunting " microlithic, but are otherwise typologically distinct. Resemblances are somewhat stressed by the use of similar raw material.

Langhnaj. Excavations at this site in Gujarat have revealed an industry connected with the " hunting " microlithic series. Finished implements are, however, rare on this site. There are two crescents (Nos. LP.1725, LP 1724), one crescentic point (No. LP.1726), and a fine point (LP.1723) blunted obliquely along the whole right edge, in the collection of the Institute of Archaeology, London.

Bellary. Many industries distributed in the Bellary District, which lies just north of the Mysore border, have close parallels with Brahmagiri. Like Brahmagiri IA and IB, each one of the sites to be mentioned below has yielded a microlithic industry associated with neolithic celts, adzes and chisels. A large percentage of the artifacts consists of unretouched parallel-sided blades. Most of the finds are unfortunately unstratified but this much is clear—that the Brahmagiri I industry was widely distributed north of Mysore.

The factory site of Kupgal is the most conspicuous. Along with celts and blades (Nos. 827-1 to 827-34(2)), cores (827-56 to 827-83)—some with as many as 12 blades struck off—were found. Such is also the case with

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(1) A detailed study of this new material has been made in Professor Zeuner's Department (Zeuner and Allchin (1956) The statements made here apply to the previously published material only

(2) All the numbers refer to Foote (1914)

the North Hill and Fort Hill of Bellary. Kotekalludrug, 8 miles east-north-east of Adoni has produced similar evidence (neolithic celt, 1441; blades, 1440-1 to 1440-16; and 4 cores).

The Cinder Camp of Lingadahalli, 30 miles north-east of Bellary contains a series of celts, adzes and hammerstones (Nos. 1464 to 1514) and microliths, mostly blades (1515-1 to 1515-86). Twenty-two miles north-west of Bellary is the site of Gadiganur which has yielded evidence of cultures ranging from the Palaeolithic to the microlithic. Fifty long blades, a few having their backs blunted, 14 cores, along with a large number of neolithic implements were found by Foote at this place. Another important site with microliths and neolithic implements is Kurikuppa, 17 miles west of Bellary (celts, etc., 1214-49; microliths, 1258-1 to 41; cores, 1258-48 to 60). Others showing similar evidence are Halekote, a fine site on the Tungabhadra, 31 miles north of Bellary, Ramadurgahill, 20 miles north-east of Bellary and Malyam, in the Rayadrug Taluk.

Much more important than all these is Sanganakallu, near Bellary itself, where the evidence comes from stratified deposits. Dr. Subba Rao (1948) found a large number of parallel-sided blades in his excavations. This industry (Sanganakallu phase II) corresponds to the microlithic industry of Brahmagiri IA - IB.

Anantapur. Lattavaramuhill site (celts, etc., 2071-82; blades, 2083-12 to 38; cores, 2083-55 to 88), Jambuldinnehill site, 10 miles north of Anantapur (celts, etc., 2095-2099; flake-blades, 2100 to 26), Kalamedevurhill site (celts, etc., 2146-2158, flakes and blades and cores, 2162, 63, 1935-2011, flakes and blades, 2040-2 to 2040-8; cores, 2040 to 32) all belong to the Anantapur District. They all appear to belong to the Brahmagiri IA - IB group of microlithic industries.

Kurnool. The Kurnool District contains a number of sites all yielding celts in association with microlithic blades. Among these are Bastipad, Veladurti and Mulagundamu fort hill. The most important site of this kind in the Kurnool District is Patpad. Here, Foote found a large number of microlithic blades (2376-95 and 2441-2474) and cores (2475-2604) with celts and megalithic pottery of forms identical with those of Brahmagiri. Whilst the celts and the microliths may belong together, the megalithic pottery may well be later, as it is in Brahmagiri.

Hyderabad. In Hyderabad, the Lingsugurtaluk of the Raichur District has a number of sites, with industries almost identical with those of the microlithic culture of Brahmagiri. Bellamur Rayan Gudda (celts, etc., 2620-23; blades and cores, 2628-2633), Kotegallu (celts, etc., 2634-38· blades 2639-1 to 42), Wuttugalluhill [1](celts, 2640-49; blades and cores, 2665-68), Anandagal (celts and chisels, etc., 2710-2719; blades, 2724-34) and Rawalkonda (celts, etc., 2786-2871a; blades, 2789-2848 and cores, 2849 to 2870) are the important sites. Two more sites in the Hyderabad State have close links with Brahmagiri, and deserve special mention: Kallur with its copper swords and microliths, and Maski[2] with its Asokan inscriptions and neolithic finds together with microlithic blades and implements. These testify to an

(1) No 2663 is a remarkably long blade of 3 3/16 inches resembling the Indus valley long blades (Foote, 1916).

(2) Annual Report of the Archaeological Department of Nizam's Dominions (1938)

identical culture or cultures. Systematic excavation of Maski will reveal these cultural links more clearly.

All these sites conform to the Brahmagiri evidence, as judged by the surface finds. More work on them is urgently needed which may show the precise relationships between the cultural levels.

Cutch. A large number of parallel-sided blades, points and retouched blades with marks of use like those from Brahmagiri have come from Lodai on the island of Cutch and are now in the Sturge Collection at the British Museum.

Nasik. Recently some more interesting evidence has come to light from the excavations carried out by Dr. Sankalia at Nasik[1]. The microliths of Nasik, too, bear a similarity to those of Brahmagiri. The evidence of pottery and copper axes from Jorwe, not far from Nasik, fits in with the general picture.

It is thus clear that the microlithic industry of Brahmagiri IA - IB had a wide distribution in South India (see Pl. IVA).

What has been said so far is based on the published evidence (except for Sanganakallu I which will be discussed presently). There are other sites from which collections have been made but not published which show that, apart from the Brahmagiri I (which appears to dominate north of the Mysore border judging from the published sites alone), there are industries which do not agree with those described.

Sanganakallu. Phase I is comparable to Brahmagiri Pre-I. This precedes Brahmagiri IA and IB on the one hand, and on the other, is distinct from Jalahalli.

Jubbalpur. This does not conform to any of the three. It appears to be a mixture and requires to be investigated.

To sum up, Mysore has yielded four types of microlithic industry:

(1) Jalahalli hunting type.
(2) Brahmagiri IA and IB urban type.
(3) Brahmagiri Pre-I type.
(4) Kibbanahalli hunting type.

H. CHRONOLOGICAL SEQUENCE

The age of the Mysore microliths now remains to be discussed.

At the very outset we are confronted with the fact that in many places in India the microliths do not seem to represent a "Mesolithic" culture, as they would if found in Europe. Some are clearly associated with the neolithic complex. Others may have been proto-neolithic, as De Terra and Paterson (1939, p.320) suggest. Microliths from Pachmarhi, Hostangabad, Singhanpur and Kabrapahar in Central India are late survivals and are not likely to antedate 500 B.C. at the earliest (Gordon, 1938, p.23). Cammiade (1924, p.101) points out instances where microliths have been found in association with proto-historic urn-burials.

(1) Unpublished.

Todd, on the other hand, believed that the microliths from Khandivli, judging by typology and patination, were much older than those of the Central provinces. These finds are outside the subject of this paper, but it is important to realise that some true "Mesolithic" phase may still be established in India. On the Sawyerpuram microliths, Foote's (1916) opinion was that they lay embedded in the fossil-sand dunes (teris) and were stained red owing to their long contact with the ferruginous soil. Aiyappan, however (1945b, p.146) who recently re-investigated the site, is inclined to believe that the implements were made only at the time when the basal level of the sand dunes (teris) was being laid down and not afterwards. He believes that the site was deserted by the makers of the microliths before the advent of the neolithic technique, since no neolithic tools have been found so far on the site or in its neighbourhood. The Sabarmati sites like Langhnai, Akhaj, Valasna and Hirpura, discovered and excavated in Gujarat by Sankalia (Sankalia and Karve, 1949) have produced implements in association with mineralised human skeletons. In fact complete skeletons of 'microlithic man' have been found. Here, too, the main series of microliths belongs to the pre-pottery layers.

Thus the microliths of India cover a long range of time. Their beginnings, indeed, may go back to a period which may one day prove to be placeable in the Mesolithic, but they survive well into the historic period, on the evidence which is available to us at the moment.

In considering the age of the Mysore microliths in terms of this background, the Jalahalli and the Brahmagiri industries must be taken separately.

The chronological evidence for Brahmagiri is fairly clear. The microlithic industry is associated, in the main, with polished stone celts of the IB and IA phases of the Axe Culture. They disappear above the layers of the Megalithic Culture, which may be safely dated to the Maurya period c.300 B.C.). The polished Stone Axe Culture at Brahmagiri has been dated to c.1000 B.C. (Wheeler, 1948) on carefully considered evidence. The microliths of Brahmagiri, therefore, range in point of time between c.1000 B.C. and c.300 B.C. This provisional dating based on present stratigraphical evidence will have to be corroborated by further study of the 'A' phase of the Stone Axe Culture.

In view of the slender evidence, the dating of the Jalahalli microlithic industry presents a more difficult problem. Differences in the implement forms from those of Brahmagiri possibly suggest a very different date.

The implements were found in a layer, above the granite and below a black soil, composed of pellety laterite and rubble of the decomposed granite itself (Todd, 1948, p.27). The chronology of the industry at this site, in the final analysis, can only be settled, if at all, by a careful examination of this soil layer. The occurrence of the tools in the pellety laterite layer appears to indicate an early age for this industry, since it lies directly above the bedrock. The black soil, one foot above this layer, produced pottery. Whether this interval of one foot between the implementiferous layer and the pottery layer suggests a break in the continuity of these two cultures requires further investigation.

Todd believed that, owing to the absence of heavier types of tools, the Jalahalli industry belonged to the beginning of the latest microlithic phase,

but the occurrence of a large quartz flake suggests the possibility that heavier tools are included in the equipment, and that their presence had escaped the notice of collectors.

Rankine (1951) suggests the following characteristics as defining the Mesolithic (see Pl. XII):

(1) Slender blades of varying lengths and widths with edges roughly parallel.

(2) The making of certain microliths by the notch method. This is an ingenious device whereby the bulbar extremities could be removed and a retouched point developed in the strongest section of the blade.

(3) Use of a steep retouch known as blunting and a lighter retouch known as trimming.

(4) Rejuvenation of cores and resharpening of tranchet axes.

Of these criteria, the last does not apply to Jalahalli for want of rejuvenated cores and complete absence of tranchet axes. A petit-tranchet is present, however, with an excellent tranchet blow across the tip. Points (1) and (3) apply in part.

Furthermore, the presence of burins has often been regarded as indicating a Mesolithic (or even Upper Palaeolithic) culture. Blade-and-burin industries have been reported from three regions in India:

(1) In and around Bombay (Todd, 1939).

(2) Madras Presidency (Cammiade and Burkitt, 1930).

(3) Jalahalli, Mysore State.

Burkitt's stage IV from the Nandikanama Pass is possibly another site of this kind and similar to Jalahalli. On this evidence it would be possible to maintain that a Mesolithic industry existed in India, were there not indications that the characteristics commonly given for the Mesolithic continued into later periods in certain regions.

Thus, Todd (1948) believed that the burin indicated an early date for the Jalahalli series. But instances are not wanting for the late persistence of the burin. For example, a series of burins including angle, bec-de-flute and busqué, occurs in the neolithic Dhobaian industry of Palestine (Waechter and Seton-Williams, 1938).

Outside India, the Wilton A and B industries from South and East Africa are strikingly like Jalahalli. Both at Jalahalli and in the Wilton sites are found:

(1) a large number of crescents

(2) a large number of thumb-nail scrapers

(3) points and burins.

One difference has, however, to be noted. No pottery is found associated with the implements at Jalahalli. The Magosian and Wilton Cultures are both associated with pottery and ostrich egg-shell beads. Wilton A and B belong to the Makalian wet phase and B continues at least into the Nakuran phase which has been approximately dated to 1000-850 B.C. by Leakey. Some African authorities even hold that the Wilton continued right to the arrival of the Europeans.

The age of the Jalahalli artifacts, therefore, cannot be determined conclusively on typological grounds. Geological evidence, however, seems to assign a greater antiquity to Jalahalli than Brahmagiri, for the implementiferous horizon of Jalahalli is covered by a sterile level and by one with "Iron Age" pottery. It would appear, therefore, that four microlithic phases can be tentatively distinguished in Mysore State:

(1) Jalahalli (2) Brahmagiri Pre-I (3) Brahmagiri I A-B and (4) Kibbanahalli. The argument for the distinction of (2) and (3) has been put forward on p. 35. Typologically the four phases are different, too, though the material from (2) is scanty. Industry (3) is plainly of the "Urban" type and (1) and (4) belong to the "Hunting" group. One must not, however, regard this ecological difference as indicating evolution. 'Hunting' and 'urban' microlithic complexes have existed in India side by side from the time of the Indus valley civilisation to the Iron Age.

Chapter IV

THE "NEOLITHIC" COMPLEX IN MYSORE

A. Introduction

The neolithic culture of India presents a complicated problem. Many so-called "neolithic" artifacts have been collected, and there is hardly any museum in India which does not possess them. But the field evidence to define them clearly as neolithic is very inadequate. The term "neolithic" is nearly always used in India to designate the presence of polished axes. They are very numerous, and there is a tendency to regard the neolithic Indians principally as tool-makers (Chakravarti, 1944) forgetting that this may have been only one aspect of a complex culture. The neolithic Indians need not have been inferior to the neolithic Egyptians, who, in addition to tool-making, knew agriculture, domestication of animals, manufacture of pottery and textile industry.

The evidence for activities other than tool-making may well have been overlooked and it is not beyond the bounds of possibility that careful excavation will uncover them in the dry earth of caves, rock-shelters and other sites. Indeed, pottery has been found in abundance at Brahmagiri, Sanganakallu and elsewhere. Neither is it impossible that a proper identification of excavated animal bones will produce proof that some of the species were domesticated (Worman, 1949). Vavilov's theories (1926; see also Watkins, 1933) of the history of cultivated plants, which are based on regularities in the distribution of crops and on the reconstruction of centres of diversity, suggest that India lay not very far from one of these, namely Afghanistan. Hence, cultivation of plants, particularly wheat (*Triticum dicoccum* and *Triticum vulgare*), may have been known in India since early times, possibly with the advent of the "neolithic" artifacts.

Neolithic celts are widely distributed in India. The first was discovered in 1861 by H. P. Le Mesurier in the valley of the East Tons river in United Provinces. Theobald (1862) and Cockburn (1879) explored a large number of sites which yielded polished stone celts in the Banda District. Ranchi, Santal Parganas and the Singbhum Districts of Bihar contain many sites. In 1872 Fraser discovered a celt-factory on Kupgal hill, Bellary District. Subsequently, Foote explored a very large number of sites in Salem, Arcot, Cuddapah, Kurnool and other parts of South India. Hyderabad, too, is rich in sites of the polished Stone Axe Culture. Mention must be made of Kotegal and Anandgal in the Raichur District, which appear to be celt-making centres.[1] Last but not least, there are the various districts of Assam, which are studded with stone-axe sites.

Mysore also abounds in sites of the neolithic group. Foote (1916) picked up stray specimens at Birmangala and Srinivaspur in the Kolar District and at French Rocks, T. Naraspur and Lakshampur in the Mysore District. Polished stone celts have been found *in situ* and have been exca-

(1) Foote's collection 7710 to 2719 (1914)
Col. D H. Gordon collected some fine specimens, which are now in the Institute of Archaeology, London.

vated from two sites in northern Mysore, namely Chandravalli and Brahmagiri (see Pl. V).

If these sites are plotted on the map, they appear to be grouped mainly in three clusters, namely:—

(1) Eastern India
(2) Central India
(3) Southern India.

This distribution of the sites is at the base of a theory put forward by Mr. Eugene Worman (1949). Polished celts being confined mainly to the eastern half of India, he postulates that the culture to which they belong was derived from the Far East. He is almost certainly right as regards one particular type of axe, the so-called shouldered celt. It is small, flat, rectangular and usually shouldered for hafting purposes. Its main area of distribution lies in Burma, Indo-China and other parts of south-east Asia. In India this type of celt is clearly intrusive and is limited in its distribution. V. Ball (1875) found this type of celt in Dalbhum, Chota Nagpur District A few come from the Tezpur District in Assam (Coggin Brown, 1917). Cammiade (1930) found a stray specimen on the Godavari. Mayurbhanj has produced some specimens too. Baidyapur, 14 miles south of Baripada yielded two small specimens. Another somewhat larger celt comes from Amsikra, about three miles south-west of Baripada town.(1) Worman (1949) picked up another in northern Mysore, without, however, specifying the exact locality. One of the specimens of the Haimendorf collection of stone implements from Hyderabad, in the Department of Environmental Archaeology, London University, appears to belong to the same type, although shoulderless.

These curious celts are so unlike anything ever made by man of the true Stone Age, and on the other hand so much like blades of metal axes or adzes, that it is difficult to combine them with the ordinary "pointed-butt" and similar types to form one "neolithic" culture complex. They are almost certainly stone copies of metal tools. That this should be so is by no means extraordinary, for, in Europe it is common to find in the Bronze Age carefully-made copies of metal axes in flint or some other rock. These specimens even occasionally exhibit the casting seams of their metal originals. It may, therefore, be presumed that the shouldered-celt culture is a late intrusion into India from the Far East, and that it is contemporary with one of the metal ages. So far as these "stone axes" are concerned, Worman's theory applies, although the culture should not be called neolithic.

Haimendorf (1943, 1945), correlating the megalithic culture of Assam with that of the Gadabas and Bondos of Orissa, points out that they all speak the same form of Austroasiatic tongue and believes that a late neolithic civilization with eastern affinities and associated with Munda-speaking peoples permeated the older population of the Deccan. This older stratum of the "neolithic" of India is perhaps represented by the pointed-butt type of stone axe. This is the most widely distributed type and forms the majority of the finds from more than two hundred sites spread over South India. The pointed-butt axe is not, however, uniformly distributed in India. It is

(1) Out of these three, two are in the Baripada Museum. information kindly communicated by Mr P. Acharya, Mayurbhanj

crowded, for instance, in the Bellary and Raichur districts, and very rare or absent in regions on both the coasts. One is tempted to interpret such uneven distribution in terms of racial movements, as indeed Haimendorf has done. But it must be noted that the distribution of these axes is clearly dependent on the occurrence of a suitable raw material, mainly trap rock. As examples, the sites of the Bellary, Raichur and Chitaldrug districts may be quoted, which are based on trap dykes. This correlation of axes and dykes was already remarked upon by the mapping geologist of the Bellary District, Bruce Foote (Pl. II).

The absence of pointed-butt axes in certain areas, therefore may be explained in one of two ways. Whilst the raw material was lacking in any case, the appertaining culture may either have been absent in those areas, or alternatively it may have been present but devoid of the axes. The former alternative is somewhat supported by Haimendorf's Munda hypothesis but the latter cannot be ruled out. It will have to be tested with care by the comparison of the pottery accompanying the pointed-butt axes where they occur, with pottery from early sites in the areas without these axes. For this reason it is worth while here to review briefly, the material culture encountered in a few "neolithic" sites.

At least three sites have revealed some information regarding the material culture of the "neolithic" people, namely:

(1) Bursahom (Burzahom) in Kashmir

(2) Sanganakallu, near Bellary, close to the northern boundary of Mysore

(3) Brahmagiri in northern Mysore.

Bursahom. The trial excavations carried out by De Terra in 1935 near the village of Bursahom on a table-land with a group of megaliths revealed a succession of three cultures.

III. contains sherds of the Buddhist period of the fourth century.

II. contains predominantly black polished ware with incised and geometrical designs belonging to the Jhangar phase of the Indus valley civilization. Apart from hearths and charcoal, fragments of polished greenstone occurred also.

I. revealed grey hand-made pottery in association with polished celts. The pottery showed textile-and-matt design. The polished celts and the pottery were embedded in a yellow loessic soil.

De Terra (1942) further obtained 30 artifacts of all sorts from the surface. These included two celts; one of trap and the other of amphibolite. This north-western site is of great interest, for it suggests on stratigraphical evidence that a polished Stone Axe Culture may antedate the Jhangar phase of the Indus valley civilization.

Sanganakallu. This site, which is about three miles from Bellary, is of great interest and has thrown some new light on the problem of the "neolithic" culture in South India. Trial excavations carried out by Dr. Subba Rao produced some 30 tools, including celts in various stages of manufacture, in association with coarse hand-made pottery. A dull brown ware occurred along with a pale-grey ware. The dull brown ware has violet and purple paintings (Subba Rao, 1948). The sherds of this painted ware have a striking resemblance to those from Brahmagiri, to be described presently.

As at Brahmagiri, they were found associated with coarse, grey hand-made ware. Nos. 5 and 6 of Subba Rao (his Pl. VII, 1948) have single violet lines on a brown background, and are comparable to T16 of Brahmagiri (Fig. 18, Wheeler, 1948). Sanganakallu No. 8 has a line and circle ornament. Nos. 4 and 9 are rim pieces of burnished bowls with red ochre paintings; similar specimens also occur at Brahmagiri. No. 7 has a wide violet band with cross-hatching and a criss-cross design below. A comb pattern occurs on No. 3. The carinated and round-based small bowl has also a comb pattern painted all round the shoulder in red ochre.

These specimens are of considerable interest since they suggest cultural affinities between the peoples of Brahmagiri and Sanganakallu.

Brahmagiri. The last of the three sites is located in northern Mysore, the region of the present survey. Careful excavation on this site by R. E. M. Wheeler (1948) has revealed some interesting details of the life of the "neolithic" people.

The site was in continuous occupation possibly from a microlithic period called "pre-I" (see p. 34), certainly from the "neolithic" onwards to the early historic periods. The polished Stone Axe Culture is found in deposits up to 9 feet thick and is sub-divided into the phases IB and IA. It is significant that there is a sterile layer in one of the excavations (BR.21) between the IB and IA levels of Stone Axe Culture.

Dwellings:—Little information is available regarding the dwellings of the Stone Axe people of Brahmagiri. No structures were found and, owing to the limited character of the excavations, no plans of the houses could be ascertained. The occurrence of post-holes, however, shows that the dwellings were probably partly made of timber. Perhaps low walls of rough granite blocks were used in addition. The occurrence of a straight line of post-holes in one of the cuttings suggests that some of the dwellings were rectangular in plan.

Disposal of the dead:—The Brahmagiri excavations have thrown some light on the burial practices of the "neolithic" people. Two forms of burials were known to them, namely inhumation and urn burial.

Little information is available regarding inhumation since only two examples occurred. One of them was completly uncovered, showing the skeletal remains of a child of 8 to 10 years of age. The head of the child faced east, and the presence of a spouted pottery vessel near its head and two small cups near its thighs suggests that rites of some kind had been performed. Whether the spouted vessel was used for pouring libation into the mouth or ears of the dead cannot, of course, be decided on the basis of a solitary example.

Urn burials, on the other hand, were frequent. They were apparently confined to infants. The bodies were closely packed into coarse, wide-mouthed urns and buried. It is interesting to note that this practice of urn burial in confined to phase "B" of the Stone Axe Culture. All the 14 urns uncovered so far belong to this phase. One of them contained a bronze pin 3 inches long and also two small pots (T36 a and b),[1] the significance

(1) These numbers preceded by a letter T, which occur on this and the following pages in connection with the pottery from Brahmagiri, refer to the figured specimens in Wheeler (1948)

of which is not clear. The bronze pin, however, may prove to be very important from the chronological angle, for it clearly shows that the Stone Axe Culture can be contemporary with Bronze Age Cultures, in spite of the fact that at Bursahom, it precedes the Indus Valley civilization, if De Terra is correct. Either, therefore, the Stone Axe Culture of the south is later than that of the north, or if one assumes them to be contemporary, bronze would have been known prior to the Indus valley phase. The first alternative is the more likely.

Pottery:—Before considering in detail the various types of Stone Axe pottery, certain characteristic features may be stressed:—

(1) Throughout the two phases of this culture, namely, A and B, the pottery is hand-made, in contra-distinction to the wheel-made pottery of the later cultures.

(2) The predominant ware, which occurs in both the phases, is of a coarse grey fabric.

(3) Though most of it is crudely made, same sherds show polish.

(4) A dominant type throughout is that of a round bottomed vessel with plain, slightly everted rim.

(5) Phase A, in addition to coarse grey potsherds similar to those of B, contains painted pottery and incised pottery. These two classes are, so far as is known at the present, absent from phase B.

Painted pottery of phase 'A':—It must be noted that the painted sherds are too fragmentary to reconstruct pot-shapes. Two types can, however, be recognized easily, namely: (i) sherds with red slip, and (ii) sherds with buff slip. The difference is not just one of colour. The techniques are different. The red slip sherds are salt glazed and burnished. In the case of the buff-slipped ones, neither salt-glaze nor burnishing occurs. The painted decoration, usually executed in ochre is in both cases applied after firing.

The decorative patterns are:—

(1) curved lines (T.6).

(2) plant design (T.3).

(3) parallel lines (T.2, T.9 and T.12).

(4) combination of curved and parallel lines (T.1).

In some cases decorative patterns are formed by incisions, which are confined usually to criss-cross and herringbone designs.

Painted pottery from the surface:—Apart from the painted sherds found during the excavations, a number were picked up from the surface, representing the three types, with red, grey and buff slips respectively. Six pieces are red-slipped and one has a wavy or zig-zag decoration in violet. Two are pinkish-buff and decorated with violet parallel lines Another pinkish potsherd has a pattern of minute rectangles in brown. Two buff-slipped sherds have dark violet bands running in a criss-cross fashion. A perforated sherd of coarse dull grey ware was also picked up from the surface. This group of finds, therefore, may be regarded as contemporary with Phase IA of the excavation.

Undecorated pottery from phase 'A':—The undecorated pottery from phase A has been classified by Wheeler (1948) according to the rim types as follows:—

Type I:	Rim pieces of dull grey jars with flaring mouth (T.25, T.26).
Type II:	Rim pieces of dull grey vases with flaring mouth (T.27, T.28 and T. 29).
Type III:	Rim fragment of red ware slightly burnished with a flaring mouth (T.30).
Type IV:	Fragment of a rimless bowl of grey ware with light brown slip (T.31).
Type V:	Rim fragment of a bowl of grey ware with an external groove just below the mouth (T. 32).
Type VI:	Spouted vessel of coarse ware with a thin terracotta red slip (T.34).
Type VII:	Neck fragment of a bottle-necked vessel of red ware with a slightly beaded rim (T.35).

Comparison with Sanganakallu:—It has already been pointed out (p.46) that the painted ware of Brahmagiri IA resembles in many respects that of Sanganakallu near Bellary, which is manifestly another site of the Polished Stone Axe Culture. This correlation is corroborated by the undecorated phase A pottery of Brahmagiri, which contains types that occur at Sankanakallu also (Subba Rao, 1948, Pls. 6 and 9).

' B ' Phase pottery:—Pottery of the ' B ' phase can be divided into (a) non-burial pottery and (b) burial pottery.

The non-burial pottery and the burial pottery are of coarse grey ware. Occasionally in the former class, a black polished ware also occurs (examples, T.68, T.63) in the upper layers. The principal types are:—

(1) vase of dull grey ware with flaring rim and globular body (T.48).

(2) deep bowls, black and brown (T.60, 62, 61, 65, 67 and 68).

(3) shallow bowls of dull grey (T.73).

Burial pottery.—A special coarse pottery was used for burial purposes by the Stone Axe people of Brahmagiri. These are mostly urns used for the burial of infants. Generally, they are hand-made, of dull mottled grey colour, coarse and micaceous in texture, and because of their non-utilitarian character are indifferently baked. They have a globular body with a wide mouth, flared rim and rounded base. At the mouth the diameter averages 13 inches.

Next to the urns come the bowls used for covering the urns. They are of two categories, namely:—

(1) lipped bowls of coarse grey colour (T.44).

(2) blunted carinated bowls of coarse grey fabric.

To the third category belongs the funnel-spouted vessel of coarse grey ware found beside the skull of the inhumation burial.

Lastly, the two small cups (T.46a and 46b) of coarse grey ware, which were placed near the ends of the two femora of the skeleton, form a sub-group by themselves.

B. CHALCOLITHIC OR NEOLITHIC?

Some Indian prehistorians cherish the opinion that South India never witnessed a Copper or a Bronze Age, but came to possess a knowledge of copper and copper-smelting only after iron had come into general use. As early as 1887 Bruce Foote published the theory that iron had been introduced among the people living in southern Deccan and iron tools were manufactured by them at the same time that they were making and still using implements of polished stone. He (1916) concluded that the neolithic people were a land-loving people as, if they were sea-faring, they would certainly have sailed to the Tenasserim coast through the Bay of Bengal and would have become acquainted with the cassiterite of that region. V. A. Smith (1905) merely elaborated this idea and held that the Neolithic Age was directly succeeded by an Iron Age. As late as 1936, N. G. Mazumdar reiterated the same opinion. When Foote and Smith wrote there was hardly any evidence contrary to their opinions. Since then, new discoveries have been made and in the light of these a chalcolithic phase in South Indian prehistory can be confidently postulated and established. The "neolithic culture" of Mysore is in fact contemporary with it. The evidence for raw material also leads to this conclusion. The Bellary and northern Mysore areas have important copper mines. Captain Newbold discovered many ancient copper mines on the Sugalammakonda, near Bellary. Gordon (1952) has noted the distribution of the ancient copper mines of South India. It is not surprising that where copper ores were readily available, they were used by man for his tools. Whether natural copper was used as such, there is no indication.

The first chance-discovery was made in 1938-39 in the vicinity of a hill near Kallur, a village in the Raichur District of the Hyderabad State. There, while blasting a huge boulder, some labourers found three copper swords. The authorities of the Archaeological Department of Hyderabad became interested since the swords resembled the Fatehgarh swords of copper,[1] found previously in the United provinces. Realising the importance of Kallur, the Archaeological Department of Hyderabad made a survey of the area near the hill where the swords were found. Their survey resulted in the discovery of a few early metallurgical sites. A small-scale excavation was also carried out at a place called Yammigudda, with important results. A broken copper axe, and a few copper fragments, a lump of copper pyrite in association with an old furnace were revealed by the excavation. With these copper objects occurred microliths. The occurrence of the furnace and the copper pyrite testifies that the copper objects were locally made. Higher up the hill, a saucer-shaped stone 4′ x 4′ showed traces of copper oxide, copper ore having been crushed on it for a long time.[2]

Fresh evidence has come from a place called Jorwe, about 150 miles North-east of Bombay, where 6 copper axes were found in one of the painted spouted jars.[3] Dr. Sankalia (1950) found identical pottery, painted and spouted, below his layer 5 at Nasik, 128 miles northeast of Bombay, in

(1) Indian Antiquary (1905) p 232.

(2) Annual Report of the Archaeological Department, Nizam's Dominions, 1937-40 p.27.

(3) Information by courtesy of Dr Sankalia.

association with blades and cores of chalcedony and chert. That the copper tool makers used microliths is thus evident.

The Jorwe pottery associated with the copper axes occurs below a layer at Nasik, which produced the N.B.P. (northern black polished ware) which is generally assigned to a period between the third and sixth centuries B.C.[1] This N.B.P. is commonly found on most of the northern sites in India like Kausambi, Hastinapura, Rajagir and Rajaghat from early layers. This datum line might tentatively be used to fix the chronology of the painted ware of Jorwe, coupled with its microliths and copper objects. A modest date would be seventh to eighth century B.C. for the chalcolithic industry, if not earlier.

We now come to the evidence for a chalcolithic phase in South Indian prehistory, and especially Mysore (Lal, 1949). The Mysore evidence is particularly valuable because it proves that copper preceded iron. The excavations at Brahmagiri produced a copper chisel (from Br. 21) from the IB layer of the polished Stone Axe Culture. A thin bronze rod or pin was found in association with an urn burial of the same culture. This culture, therefore, was characterised by the combination of:—

(1) polished stone axes.
(2) microlithic blades.
(3) copper objects.
(4) the conspicuous absence of iron.

The evidence was further corroborated and confirmed by Br. 17. From one of its early layers a copper rod was unearthed This cutting, too, did not yield any iron object.[2]

Brahmagiri also throws some light on the disputed question of copper alloy (bronze). A chemical analysis of the rod or pin already mentioned revealed the presence of 9% of tin. This shows that the preparation of bronze alloys was not unknown in the Brahmagiri IB culture. One could, therefore, legitimately call this culture a chalcolithic or even a Bronze Age one. Nevertheless, metal tools are rare and, economically, this culture was still essentially "neolithic." As to IA, no metal has been found, but in view of the small size of the excavation, this need not be significant. Whether IA represents a "true neolithic" culture, therefore, remains to be decided. Since both IA and IB are technologically mainly "neolithic," this term is retained here for the time being.

C. POLISHED STONE IMPLEMENTS

It is hardly too much to say that the axe is one of the basic inventions of man. It has its forerunner in the cleaver which, functionally, is an axe, though it has no artificial handle, the handle being replaced by the arm of the user. The concept that "tools are extensions of the body" is well illustrated by the development of the artificial handle, which first appears in the Mesolithic (Thames "picks" were probably hafted) and is invariably

(1) For want of fresh evidence, this dating is accepted here in a preliminary manner

(2) This evidence is quite consistent with that produced by excavations both in 1940 and 1942 when the writer and Dr Krishna carried out excavations on the same site

present in the neolithic. The deer antler appears to have been the usual pattern from which the hafted neolithic axe is derived.

Antler axes appear to be quite early. For example, the Lyngby axe (the "antler-adze" of Childe) is considered to be the earliest in Europe by Clark (1936) and its date is between 9000-7000 B.C. (Zeuner, 1952).

Polished axe-like stone tools have been found in large quantities in southern India. Usually they are called axes or celts but it is important to distinguish several functionally different types (Childe, 1950b). In an axe the cutting edge is parallel to the handle, in an adze it is right angles to it. Adzes therefore usually have asymmetrical cross-sections of cutting edges. In Mysore the majority of "celts" are true axes, but adzes are by no means absent (Pl. XIX, fig. 1).

In addition to celts "neolithic" cultures yield chisels which in all probability were not hafted. They appear to be rare in Mysore, for none has so far been published. The writer succeeded in collecting a broken chisel at Brahmagiri. This interesting specimen (Pl. XIX, fig. 2) was polished all over the preserved portion. The cutting edge is almost half an inch long, which is about half the width of the body of the chisel and it is slightly convex. There are use-marks on the edge, so this tool appears to have been fractured while being used. Outside Mysore, chisels have been found at a number of sites, especially those of the Bellary area. In view of the proximity of these to Mysore, the scarcity of chisels in Mysore should not be taken as a basis for far-reaching speculation; it may be accidental.

Other neolithic equipment comprises hammerstones, which may be grooved for hafting (Subba Rao, 1948, Pl. 23, fig. 20-25), or more frequently ungrooved. The latter grade unto "pounders" (Wheeler, 1948, Pl. 116) which often are spherical. These occur in fair numbers at Brahmagiri, whilst grooved hammerstones appear to be rare in Mysore.

A type of stone-tool called "fabricators," made from long flakes but supposed to have been used after the fashion of a baton to pound the sides of rough-outs when manufacturing stone celts, has been described by Subba Rao (1948) from Sanganakallu, but has not yet been found in Mysore.

D. TECHNIQUE OF MAKING CELTS

Even a cursory examination of a group of celts shows the various stages of their manufacture. At Brahmagiri in northern Mysore the writer has been able to establish the same process of manufacture which has been described from Sanganakallu near Bellary (Subba Rao, 1948). A large number of axes has been collected at these sites both from the surface and excavations, in all stages of manufacture. Along with these specimens there also occur quantities of waste flakes at both places, which clearly show that these were factory sites.

Foote (1916) distinguished four stages of manufacture, namely.—

(1) flaking (called by him "chipping").
(2) pecking.
(3) grinding.
(4) polishing.

Convenient nodules of rock were taken and subjected to a process of flaking. From both faces or one face as the occasion demanded, coarse or primary flakes were removed from the core, to give it the approximate shape desired.

Of these four stages (3) and (4) are difficult to distinguish, since specimens that have been resting in the soil will have suffered chemical corrosion, whilst specimens embedded in sediments such as hillwash formed on slopes, will have suffered abrasion. In fact polish is usually observed on very fine grained rocks which lend themselves naturally to the process, but celts made from the coarser rocks may never have gone through a special polishing stage after the grinding. Subba Rao (1948), too, admits that final polishing was applied to " a few selected specimens " only.

The pecking as described by Foote is readily observed on many specimens, for instance at Brahmagiri (Pl. XX, fig. 1). It appears, however, that the sequence (1) - (2) - (3) - (4) was often modified by alternating the pecking and grinding. This is shown for instance by a celt from Anandagal, Hyderabad, collected by Col. D. H. Gordon. This specimen is finished as regards its shape, no trace of the flaking of stage (1) being left on its surface. It has a regular, sub-circular cross-section. Except for the two faces of the cutting edge, the entire surface is covered with batter-marks, plain evidence that it was pecked all over. It may therefore be suggested that pecking was deliberately applied to surfaces ground smooth, because it woud reduce the resistance of the surface to further grinding. The grinding process would thus have been accelerated considerably.

It may well be that alternate pecking and grinding was applied many times over in the case of well-finished implements.

The making of a polished celt being a long drawn-out process, much care was exercised in the selection of lumps of raw material of suitable shape, many being made specially, i.e. struck from the rock as primary flakes. Foote (1916, p.18) already pointed out that skilful use was made of joint planes in the rock, in order to save labour. This was obvious enough in many specimens, including some among the Mysore material. Worman's (1949) trapezoidal and rectangular sections may in part be due to joint-planes. In the flaking stage, too, attention had to be paid to the future act of grinding. Very often, rough-outs were prepared by coarse flaking, and the edges and eminences were then worked off by controlled flaking and sometimes retouching of the edges. This had the purpose of straightening the edges before the grinding began and was occasionally excuted with almost " Acheulian " care.

For certain shapes, special lumps of rocks were required. Worman (1949) points out for instance that rectangular, flattish celts were made from large flakes taken from cores from which flakes had been removed previously, so that both surfaces of the flake were parallel.

Interesting evidence of grinding, particularly of the cutting edges was found by Foote (1916) on the North Hill at Bellary. He noticed five or six well-polished grooves seven to eight inches long and one to one and a half inches deep, on the rock surface. The grooves all lay parallel together and in close order within an area of less than 20 inches square. Similar grinding grooves were found at Helalagundi, on the 19th February, 1889, in Alur Taluk. Grinding grooves which were excellently preserved also occurred

on the Kappatralla hill in Pattikonda Taluk, Kurnool District and Pullayyagudda in Hyderabad State respectively. That these grooves are associated with the axe-makers is further confirmed by De Terra's (1942) discovery of a large boulder of quartzite with seven grooves, each measuring six inches in length and one and a half inches in depth, near Bursahom, another neolithic site, in Kashmir.

So far, no grinding grooves have been found at Brahmagiri. In view of the fact that axes in all stages of manufacture are found at Brahmagiri, it is not unlikely that such grinding grooves are also present at that site.

To sum up, it must be said that the process of manufacture was remarkably complex. It cannot be described in two stages as Worman has done, and even Foote's stages do not fill the bill. The complete process would have been as follows:—

(a) selection of natural lump or striking of primary flake,

(b) coarse flaking (rough-out),

(c) retouching by further flaking and straightening of edge.

(d) pecking } alternating repeatedly
(e) grinding }

(f) polishing.

E. AXE TYPES FROM BRAHMAGIRI

Apart from the numerous axes picked up from the surface, Brahmagiri has yielded specimens *in situ* during the excavations in 1940, 1942, and 1947. The 1947 excavations alone yielded 15 complete specimens and 29 broken ones. All the axes, it is interesting to note, belong to the pointed-butt type. Besides the large number of celts, the presence of cores and flakes from the occupation-strata clearly shows that Brahmagiri was a factory-site, a centre of local industry. From a close study of the material, two stratigraphical observations emerge:—

(1) The majority of the axes belongs to phase IB.

(2) A particular type, namely the flattened-lenticular type, is confined to the 'A' phase. Only a single specimen (Br. 22-333) of this type, however, has been found so far *in situ*. It is a small flat axe with roughly parallel sides which, at the butt end, converge abruptly. An identical specimen, flat and thin, was picked up from the surface by the writer (Pl. XIX, fig. 3). Similar types were found beyond the Mysore border at Sanganakallu (Subba Rao, plate XXI, 9, 1948). De Terra (1942) recovered a rectangular-sectioned celt from the bottom level of his trench 2 at Bursahom. This evidence is at present taken to indicate that celts of this type (with rectangular section) characterise the early series. It should be clear, however, that the evidence is still too scanty to be sure of this. At Brahmagiri, a solitary *in situ* specimen is known, whilst at Sanganakallu the horizon of these celts is unknown. It Kashmir they were indeed found at the base of the series, but this part of India is far removed from Mysore. These flat types were probably adze-blades, and there is no reason why they should not be present throughout the neolithic period. It should not be assumed, therefore, that their restriction to the lower level is a securely established fact.

In the excavations report (Wheeler, 1948, p.247) the Brahmagiri axes are classified according to shape. In doing so, Wheeler found it convenient to subdivide the material into a group A in the flat or flattened-lenticular section, and B, with lenticular or ovoid section. Each group is further divided into three sub-groups and these sometimes into minor variants. Whilst this scheme serves well the purpose for which it was intended, namely to describe the shapes, comparison with material from several other sites has brought the writer to the conclusion that there is little stratigraphical or even functional significance in these types, except for the fundamental division into axes, adzes and chisels already made by Wheeler.

There is an indubitable adze, from the upper level of the B culture, which is figured in the excavation report, fig. 33, p.249. A further specimen, made on thin flake, was found by the writer (Pl. XIX, fig. 1).

In addition, there are further thin specimens with symmetrical cross-sections of the cutting-edges, very variable in shape and in the length and straightness of the cutting edge. To this group belongs the specimen Br. 22-333, already discussed, which has remarkably straight edges. It comes from level IA. A similar specimen is Br. 21-277, from the middle stratum of the IB culture. Wheeler rightly regards it as a variant of IA, and no stratigraphical significance can be attached to it. Functionally, they must have been different from the heavy, pointed-butt axes. Perhaps they were adzes, or else they were used as axes or adzes as the occasion demanded. Polynesian tribes make such adze-axes, with a turnable sleeve. For this reason, this group is tentatively called here " adze-axe blades." It is characterised by its thinness, its manufacture from the thin flake, and its symmetrical edge. Shape and length of the cutting edge are variable, as is the outline of the whole specimen.

Though all good pointed-butt axes of Brahmagiri come from level IB, the broken specimens from IA are evidently like them. Otherwise they would have been described in the excavation report. Furthermore, Subba Rao did not establish a sequence based on axe-evolution at Sanganakallu Thus, the material so far available is still insufficient to distinguish typological phases by means of the polished stone axes. This does not, of course, preclude the possibility that future work might reveal such sequence. But the writer does not consider the prospects as bright, in the view of the fact that the polished axes (and adze-axe blades) so far found elsewhere, mostly conform to the Brahmagiri type, provided the " Burmese type " is regarded as a group apart.

To sum up, the following types from Bramagiri may be distinguished, namely:—

(1) The pointed-butt specimens.
(2) Adzes.
(3) The axe-adzes.
(4) Chisels.

F. MODES OF HAFTING BRAHMAGIRI AXES AND ADZES

In discussing the use of the polished stone axes, two alternatives suggest themselves. It is possible that the axes were used loose, in the hand. It seems more likely, however, and is in agreement with evidence obtained in

Europe, that they were suitably hafted. That this is the usual practice regarding polished stone axes is shown by the cultures of certain tribes of Australia and America. In addition, there is some archaeological evidence from Asia. Mallowan (1935) in his excavations at Tall Arpachiyah (his layer TT6) discovered a wooden haft with a curved handle. A stone celt was found lying on the floor of a house. The haft was reduced to a thin film of carbonised wood which survived in the form of powder, but the outline was still clearly preserved in the soil.

Another interesting discovery is an axe with a groove at the wide butt-end, made in the Banda District of the United Provinces, India. This, however, appears to be the only grooved specimen known from India, and therefore should not be taken as a type characteristic of the Stone Axe Culture as a whole. It is an exception and perhaps of very recent age. Being broadest at the butt end, it differs radically from the pointed axes known from elsewhere. Grooved hammerstones, however, are common. The axes found at Brahmagiri and Bellary afford no direct evidence of hafting.

Foote (1916) suggested a method of hafting which he called 'spearhead' type. A bamboo would be cut about three to three and a half inches above one of the joints to fit over the butt-end. The implement thus encased in the socket would be fastened by a strong lashing. This method cannot be conveniently applied to axes used purely for hacking or chopping purposes, since the handle is parallel to the long axis of the implement.

Coghlan (1943) has illustrated several methods of hafting axes and adzes. It is obvious that all these methods cannot be applied to the Brahmagiri assemblage of celts. His suggestion that the form of the axe largely conditions the mode of hafting must be borne in mind while deciding the mode of hafting used by the makers of the polished stone celts of Brahmagiri.

It has been already pointed out that the majority of axes from Brahmagiri and other parts of South India are pointed-butt specimens. They are thick-bodied and heavy, and therefore the following methods of Coghlan, namely "club" haft (his fig. 16), "slot" haft (his fig. 12), and modified "slot" haft are the only ones that could have been used. Such hafts can accommodate heavy and powerful axes, such as those of a length of eleven and a quarter inches and a width of cutting edge of three and a half inches. Such a specimen was actually found in 1947 on the surface at Brahmagiri (preserved in the museum of the Department of Archaeology, Mysore).

The small thin adze from Brahmagiri might have been mounted on a "knee" shaft, as illustrated by Coghlan (his fig. 11, p.37), and other adzes might have been mounted the same way.

But there are many ways of mounting adzes, so that it is useless to speculate. It should only be noted that the thick adze described by Wheeler from Brahmagiri has a pointed butt, which suggests a haft of the ordinary hole-type, unless a sleeve was used. Australian natives achieve all manner of hafting by using resin in quantity. The possibilities are many, therefore, and certainly more varied than suggested by Foote.

The "Burmese" type axes and adzes with their straight butt-ends may have been mounted on step-hafts, a rectangular step providing a stop for the blade, which prevented it from being driven further into the haft.

One more word should be said about the adze-axe blades. Though they may have been hafted in many different ways, they would lend themselves to mounting in pivot-sleeves. Such mounts are known from certain Melanesian islands, where a club-shaft with a large hole holds a long sleeve-pieces with the blade at the end. This sleeve-piece is thickest near the blade, but its thin end protrudes from the other side of the shaft-hole. The sleeve, therefore, can be turned at will, so as to use the implement either as axe or as adze. That this ingenious contraption may not be restricted to Melanesia is suggested by a neolithic specimen in the Landesmuseum, Zurich, figured by Clark (1952, pl. IX, fig. b.).

G. CHRONOLOGY

The dating of the polished Stone Axe Culture of India is complicated by the survival of the polished axe into the Iron Age. Worman's (1949) suggestion that this culture lingered on in South India until the 4th century B.C. is quite consistent with the Brahmagiri evidence, provided one accepts the few specimens found in the Megalithic levels (7) and (8) as contemporary with the Megalithic. It is on this evidence that Wheeler holds that there is an actual overlap between the polished Stone Axe and the Megalithic Cultures. Pottery evidence can be adduced to strengthen this view. If it is right, the polished Stone Axe Culture would have existed in a pure condition at Brahmagiri in the 4th century B.C. and perhaps still in the third. By the second century the Megalithic builders would have appeared and mixed with the stone axe makers. This argument has, however, the weakness that the specimens occurring in the overlap levels cannot be proved to have been contemporary, even if the axes which appeared in the Andhra layers are discounted as strays.

What is the date of the beginnings of the polished Stone Axe Culture in the Indian subcontinent? The discovery of stone axes at Copper and Bronze Age sites is significant. Marshall (1931), Mackay (1937-38), Hargreaves (1929) and Ross (1946) found them in Mohenjo-daro (Pakistan), Nal in Baluchistan and Ranaghundai. But all these are stray finds, outside a stratigraphical context. Assuming that they are indeed contemporaneous with the Indus Valley civilization, a reasonable date would be of the order of 2500-1500 B.C. The possibility cannot be ruled out, however, that on all these datable sites, the Bronze Age was preceded by a pure neolithic stone age complex. How many centuries should be assigned to this stone age complex can only be guesswork. It would not be unreasonable to assign 4 to 5 centuries for the development of such pure "neolithic" stone age culture, taking its inception back to perhaps 3000 B.C. In fact, Worman (1949) dates the appearance of the Indian "neolithic" culture between 3000-2500 B.C., a view which is in agreement with the suggestion made here.

The next problem is the dating of the beginnings of the Stone Age Culture of Brahmagiri in particular. Paterson who in 1936 made a study of Foote's collection of Bellary "neoliths" assigned an enormous antiquity to them.(1) Though typologically the celts of Brahmagiri have a striking

(1) In Ancient India, No. 3, p 39, Krishnaswami relates this view of Paterson I have been unable to find a paper by Paterson himself explaining this matter

similarity to those of Bellary, the time-relation between these industries should not be based on typology but be solved stratigraphically by a large-scale excavation.

The 1947 excavations at Brahmagiri, carried out by R. E. M. Wheeler, have already provided some evidence for the solution of this problem. The sequence of the various cultures is, according to Wheeler:—

III. 'Andhra' Culture: *c.* 1st cent. B.C. to 1st cent. A.D.

II. Megalithic Culture: *c.* 300 B.C. to 1st cent. A.D.

I. Stone Axe Culture: *c.* 1000 B.C. to 300 B.C.

III and II are datable from historical finds, the Andhra coins being associated with Roman coins of 1st century B.C. and the typical pottery from other sites providing the evidence for dating III. The Megalithic culture is dated by Wheeler (1948, p.202) as beginning after Asoka. The deposits of IA and IB cultures are 9[1] feet thick. Wheeler (1948, p.201) has suggested a mean accumulation rate of 3 to 4 feet of occupation soil in two centuries. He is very cautious in proposing this figure, which is based on a method of calculation of time for deposits applicable to Sirkap and Bhirmound of Taxila. If one applies this rate to the IA and IB cultures of Brahmagiri one obtains a duration of at least 600 years. Considering that the buildings of the polished Stone Axe Culture are likely to have been of a flimsy nature, the accumulation rate may well have been slower. Accepting the minimum of 200 B.C. for the Megalithic Cutlure, the minimum date of 800 B.C. is obtained for the beginnings of the polished Stone Axe Culture at Brahmagiri. It may, however, well have been earlier.

It must be admitted that these figures are too vague to be satisfactory. Being what they are, they suggest that the polished Stone Axe Culture of South India was later than the polished axes of northwest India. This must on no account be regarded as the result of sound investigation, but merely as a suggestion, which should stimulate further research.

(1) In the cutting, Brahmagiri 21, there occurred a sterile layer (18) on layer (19) Similar evidence was observed in Brahmagiri (17) The significance of this level is not yet known Whether it represents a break in the occupation, with temporary desertion of the site remains to be determined This is certainly possible since, according to Wheeler (1948, p 22) the decorated and incised wares stop at the sterile layer. Soil samples from sections Br 21 and 17 have been obtained They will be investigated in due course.

Chapter V

THE MEGALITHIC PROBLEM IN MYSORE

A. MEGALITHS IN RELATION TO RAW MATERIAL

The Mysore area is remarkable for its megalithic remains. In this respect it resembles Bellary, Hyderabad, Malabar, North Arcot and other parts of the Madras Presidency, where large numbers of megaliths have been discovered. In fact megalithic monuments are even more numerous than mediaeval temples, for which Mysore is equally famous. Sometimes both occur side by side, a fact which illustrates the control that the raw material exercises on the location of such activities as temple building and megalithic construction.

More than 35 megalithic sites have been discovered (Pl. V) and one of them, namely Brahmagiri, has been scientifically excavated. Generally they are located at the foot of granite hills overlooking irrigated fields. Brahmagiri, Gallapalli, Mallapuram, Addaguppa are good examples. Hunt (1924) noticed the same fact in Hyderabad, as did Krishnaswami in his recent megalithic explorations of the Chingleput area.

This location appears to be the result of the megalith builders' dependence on a suitable building material. Crystalline rocks have, in India, certain qualities which make them eminently suitable for the purpose of building, qualities which are due to their rectangular jointing coupled with thermal disintegration and, to a minor extent, chemical weathering. These rocks break easily into large slabs; they are concentrated as boulders and slabs on hillsides and they are easy to work with iron tools (see Newbold (1843)).

The granite slabs, which form the cists, could easily and conveniently be detached from the nearest part of the hillside by fire and wedges, unless indeed they had already been prepared by nature. The granite boulders used for the stone-circles could be roughly shaped where they lay and rolled down before being carried or pulled to the place of erection by men or bullocks. The occurrence of suitable raw material quite close to the actual site of the megalithic monuments thus saved a good deal of labour and transportation. It is this combination of factors, which largely explains why South India and the non-trappean Deccan constitute a classic land of megaliths. The megalith peoples might have migrated elsewhere, but been unable to build megalithic monuments where the rock did not lend itself to the method they employed.

B. GEOGRAPHICAL LOCATION OF SITES

A note on the geographical location of the megaliths, district by district, in the Mysore State is herewith provided.

Mandya District. At one place only, namely Halagur, 12 miles from Malavalli, a Taluk town, a few stone circles have been observed.

Mysore District. So far, this district has not yielded many megalithic sites. Foote collected megalithic pottery from many places on the bank of the Cauvery river. But today no signs of megaliths are to be found there. However the isolated conical hill of Bettadapur which rises 4,389 feet above sea level, has at its foot a number of stone-circles. The village there is situated on the Periyapatna-Hassan road.

Kadur District. At present two sites are known.

The village of Mattavara is situated in the Chikmaglur Taluk. It has attracted attention because of its mediaeval Jaina temple. Equally important is the large number of cists without stone-circles on the Government plantation to the southwest of the village. Most of the slabs of the cists have unfortunately been pulled out for building the Taluk office at Chikmaglur. The slabs measure about 9 by 8 feet by 10 inches. Most of the cists have been opened. Some spears and pottery, are said to be in the charge of the local police.

Sakkarepatna, a small town 14 miles northeast of Chikmaglur on the Kadur-Chikmaglur road is surrounded by the famous Bababudan mountains and harbours a few stone circles.

Bangalore District. Bellandur, a village near Bangalore, has some cist-circles. Instead of rough boulders, rough slabs of various sizes were used for the circles, standing in a slanting position and deeply buried. The site is on the property of Mr. E. M. Morrel of Bangalore. Mr. Bush excavated four of them and collected some pottery and iron objects. The fifth, excavated by the Archaeological Survey of Mysore in 1916, revealed a cist with a port-hole.

In the vicinity of Channapatna, 37 miles southwest of Bangalore, on the Bangalore-Mysore road, some cist-circles are to be seen. At Banvali, one mile from Channapatna a megalithic tomb was excavated by Mr. Kandoji Rao on the 12th September, 1897. A thick-walled and red polished pot (broken) with four thick legs, together with some iron implements and a bronze ear ornament from this grave, are in the Madras Museum.(1)

Stone-circles of varying sizes are seen near the village of Managondahalli, 8 miles from the Taluk town of Devanahalli. Two of the stone-circles were opened(2) and contained no cist in either case. Previously another stone-circle had been opened by the headman of the village, who had collected some interesting pottery. It had a cist, which suggests that both pit-circles and cist-circles exist here side by side.

Savandurga, 22 miles west-southwest of Bangalore, is an enormous mass of granite, in the Magadi Taluk, which rises to 4,024 feet above sea level. At its foot, a large cist-cemetery lies in the jungle. Apart from the cists and stone-circles, the site contains other types of megalithic monuments. There is a fine dolmen, and examples of free-standing chambers (i.e. almost entirely above ground).

The cists are oblong and covered with capstones, which are huge undressed slabs 8 to 14 feet in length, 7 to 10 feet in width and 6 to 16 inches

(1) Numbers 263-1 to 263-9 of Catalogue Raisonné of Foote, 1914

(2) Report of the Archaeological Department, Mysore, 1917 No sections, plans or any other evidence of stratification are available

in thickness. The cist-slabs are 5 to 10 feet in length, 4 feet 6 inches to 5 feet 6 inches in height and 2 inches to 6 inches in thickness In view of the comparative thinness of the cist-slabs supporting the huge capstone, it is not unlikely that the cist was surrounded by and covered over with earth before the capstone was placed on top. At this place were found double or treble stone-circles.

Near the village of Koramangala, Magadi Taluk, there is a field of cist-circles with rough boulders and gigantic slabs.

The village of Sonnappanhalli is situated 13½ miles north of Bangalore. Its cist-cemetery shows port-holes 2½ feet in diameter.

A vast cist-cemetery, covering an area of more than one mile occurs to the east of the village of Chikjala, 15 miles north of Bangalore. The cover slabs are 15 feet by 15 feet and in two cases where the cist is visible the eastern slab has the port-hole. Pottery and iron implements collected from the tombs by Col. Branfill are in the Madras Museum.

Hassan District. The Hassan District has a large number of megalithic sites. It attracted the attention of Captain J. S. F. MacKenzie as early as 1873. Certain mounds, however, which he saw above the ground are perhaps not megaliths, since their edges are not marked by the usual stone-circles. The stone structures which he described are small. Today, they are used as temples for the village goddess. Though they may have originated as prehistoric monuments, the possibility of their recent age must be considered seriously. Wheeler, for instance, figured a Naga shine from Brahmagiri, which is quite modern, and Elwin (1951) refers to the various types of monuments to the dead originally or even now made of stone by the Bhil of central India. D. H. Gordon further believes that the wooden posts of the Korku are derived from stone prototypes. In short the tradition of using stone for the making of monuments is by no means extinct in India, and it is indeed probable that Mackenzie's stone shrines belong to the "recent" category. Mackenzie also noted a few menhirs and stone-circles.

A recent exploration of this area has yielded a further number of stone-circles, such as Gunni and Halebid, two out-of-the-way villages. Honnavara and Pumgame are villages, 5 miles from Dudda, a small railway station on the Mysore-Hassan line. The megalithic monuments at Pumgame stand on high ground 200 yards to the south of the village. Here and there menhirs are seen.

Kondajji is a small village about 6 miles to the northwest of Saligame. About a furlong from the local temple, there are to be seen on rising ground two dozen stone-circles, with an average diameter of 25 feet. On an eminence to the north of the village of Sompur in Arkalgud Taluk, a number of stone circles enclose small mounds. Some of them appear to have a pit or cavity in the centre and therefore may be pit-circles.

Tumkur District. Only one site is known from this area. A low range of hills begins at Kibbanahalli, and runs along northwest of Chikkanayakanahalli. On the crest of the low ridge 3 furlongs west-southwest of Kerala Katte, H. K. Slater (1906) noticed half-a-dozen cist circles. The cists are 8 feet square and composed of granite slabs. They are obviously in a disturbed condition, and it has indeed been reported that they were rifled a few years ago. A few more stone-circles two furlongs southeast of point 2203 are fortunately intact.

Kolar District. This District abounds in megalithic sites. Just south of Garudanahalli, 2 miles north of Narasapur in the Malur Taluk, lies a range of gneiss and granite hills, extending to the Kolar hills. Near the village, covering an area of half a square mile, are about 100 cist-circles (Cole, 1873). The port-holes at this site are not more than a few inches in diameter and covered by a round slab. Some menhirs are also found near the stone-circles. Mr. Cooke of the Kolar Gold Fields opened some of the tombs in 1914.

Numerous cists occur in the valley between Avati hill and Koligudda. The slabs that cover these are very large and measure 9 to 10 feet square with a thickness of 1½ feet to 2 feet. In Arthur Cole's time a few of these top-slabs were unfortunately blasted to pieces to remove the grave goods.

On an eminence to the east of the village of Garudanapalya, there are a few cists. The landlord of the place found it profitable to remove most of the slabs in order to build a well. Some of the finds are reported to be in his possession.

Parandapalli is situated at a distance of 2 miles from the travellers' bungalow of Robertsonpet. This village lies in the midst of a number of rocky heights. To the east of the village, about two miles away (near the 7/4 furlong stone from Betamangala) on the top of a rocky ridge and on its sides, are seen more than 100 stone-circles, appearing just above ground level. They have a diameter which varies from 7 feet to 40 feet.

On the Kolar-Betamangala road in craggy country lies the village of Hunugundapatna. The locality is given its character by the conspicuous tor with a smaller boulder perched on it. The place abounds with cave-shelters. An interesting series of pottery, red-and-black ware, possibly of the megalithic period, can be collected from the site. But its sequence cannot be worked out without obtaining stratigraphical evidence by means of an excavation. Two miles from this place is situated the village of Hunugunda,(1) Bowringpet Taluk, with several stone-circles. They have diameters which range between 15 and 20 feet. Many of the boulders of the stone-circles are missing, having been removed by the villagers.

On the slope of Murugamale hill, 7 miles from Chintamani, traces of megaliths occur. Typical megalithic pottery is found, as also at Haralakote, 5 miles to the east of Srinivaspur.

While travelling on duty in the capacity of Inam Commissioner of Mysore, Captain Cole saw a menhir at Perisandra, near Chikballapur. The adjoining village of Mashalli produced 54 port-holed cist-circles with huge unhewn blocks of granite as capstones.

A few feet off the main Gudibanda road, Cole (1873) saw the outline of black pottery in the hard gravel where the road had worn down level with the mouths of these vessels, the cist-slabs having been removed probably by the Woddars or stone-workers.

He came across a number of stone-circles at Gudibanda itself. On approaching Kolar town, near the third mile, he observed some cist-circles. He excavated a few and found pottery incised at the rims.

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(1) It is known as 'Porkunram' in the tamil inscriptions.

Two miles from Bowringpet, en route from Kolar, a few pit-circles were found. The presence of a slab with a port-hole at the place also suggests the existence of cist-circles. Two miles east of the village of Margal, pit-circles and cist-circles also occur together, as is the case at Brahmagiri.

Chitaldrug District. The northern part of Mysore (mainly the Chitaldrug District) is rich in megalithic sites. It is contiguous with Bellary, Rayadrug and Anantapur, where hundreds of megalithic monuments are found. On the evidence of pottery produced by a few megalithic tombs, particularly Guntakal, all these regions probably belong to one cultural zone. More intensive work, however, is required in this area to confirm this suggetion.[1]

At Nandanhosur, 12 miles west of Chitaldrug, Ganjippata, 6 miles west of Chitaldrug, and at Budnapur, 3 miles west of Chitaldrug, stone circles occur.

Foote in 1896 collected some pottery from cists obviously disturbed by woddars (stone masons) from the village of Talya in the Holalkere Taluk of the Chitaldrug District.

The Andhra site of Chandravalli is situated at the northwest foot of the Chitaldrug hill. There is an extensive valley close to the modern town of Chitaldrug. Half-a-dozen cists of small size without stone circles and top slabs were found by Dr. Krishna (1929) during trial excavations. Excavation 5 revealed a small cist 3 feet by 2 feet which appears to have contained skeletal remains.

Near the town of Molakalmuru, a few stone-circles were observed by Mr. V. D. Krishnaswami, but the most extensive and important megalithic site in the Chitaldrug District is Brahmagiri, a few miles north of Molakalmuru. At a distance of half-a-mile east of the remains of the ancient Asokan town, there occurs a vast field of megalithic monuments. Many of them have been removed by farmers, but a few hundred still survive here and there.

It must be mentioned that the mere presence of the megalithic structures may not by itself be of great interest to the archaeologist. Even to excavate a hundred of them with the utmost care would not necessarily add significantly to our knowledge of their chronology. The crux of the problem is to find a site where the megalithic culture can be correlated with a dateable culture-sequence. This would enable progress to be made from the known to the unknown. Luckily Brahmagiri has provided this type of evidence and, to a certain extent, solved the riddle of the megaliths. The occurrence of pottery forms and fabrics, typical of the megalithic tombs in the stratified deposits of the Asokan town-site of Brahmagiri, provided the clue to their date.

The megaliths of Brahmagiri (Wheeler, 1948) fall into two categories, namely:

(1) cist-circles (Megaliths I, IV, V, VI, VIII, X).

(2) pit-circles (Megaliths II, III, VII, IX).

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(1) Though there is a common megalithic complex, the megaliths may not belong to one culture The three regions subjected to a detailed ground survey since 1944, namely Cochin Pudukottai and the Chingleput District, have shown the individuality of each Pudukottai is characterised by the elaborate transepted port hole cist Cochin has its typical topikals and rock cut caves common on the Malabar coast The dolmenoid cists of Chingleput invariably enclose a terra cotta legged Sarcophagus (Ancient India, No 5, 1949, p 36) To this we may add the Brahmagiri Bellary Rayadrug area with its cist circles and pit circles which forms a separate entity by itself

In the first type the cist at the centre is surrounded by a stone circle. The pit circles, as the name indicates, has a pit instead of the stone-cist. The outline of this pit in the centre of the stone-circle can be traced and planned by careful excavation.

Adjoining Brahmagiri but beyond the political boundary of the Mysore State, many other megalithic sites occur. Sanganakallu, 3 miles from Bellary, is an important site (Subba Rao, 1948). Guntakal, which is a railway junction, has yielded pottery from megalithic tombs strikingly similar to certain pottery forms of Brahmagiri. Kalyandrug in the Anantpur District is another site.(1) Rayadrug, a neighbouring district, has produced from its several sites (namely Mallapuram, Addaguppa, and Gallapalli) 1210 megalithic monuments, out of a total of 2129 from the whole Bellary District. More than three-fourths of the total of megalithic monuments are concentrated here.

The geographical entity formed by the valley of the Chinna Hagari river which comprises both Rayadrug and Brahmagiri (see Chapter I, and Pl. V), shows certain cultural affinities. The whole valley is studded with megalithic sites, which indicate that the same people occupied these areas and practised the same burial customs and that their culture survived into early historic times, and a large number of sites occur with polished Stone Axe Culture associated with microliths (see Chapter III).

C. MEGALITHIC ARCHITECTURE

The main types of megalithic monuments found in the Mysore area are:—

(1) Dolmens.
(2) Menhirs.
(3) Cairns.
(4) Port-hole cist-circles.
(5) Pit-circles.

Making allowances for their own individuality(2) as evidenced in certain areas, no one particular type is confined to one particular site in the Mysore area. For example, at Brahmagiri, we have the menhirs, pit-circles and cist-circles. At Savandurga in the Bangalore District, dolmens occur together with cist-circles. In a few sites of the Kolar District, pit-circles and cist-circles exist side by side.

Most megalithic structures are of a complicated design and a brief description of their architecture is necessary to make clear the ideas and motives relating to the burial customs of the megalithic people. Even a superficial examination of the structures makes it clear that a huge effort was involved in bringing them into being. Two alternatives emerge. The first is that the whole community was responsible for the erection of the monuments, sharing the effort incurred. The other is that building a megalithic monument with its elaborate grave furniture, such as choice pottery, iron implements and in some cases finely made beads of etched carnelian and gold, was

(1) Annual Report of the Archaelogical Department, Southern Circle, Madras 1912-13 (1913), pp.53-62.
(2) Ancient India, No 5, 1949, p 36

exclusively confined to the richer stratum of society, who could muster the workmen.

There are five stages in the construction of a megalithic tomb, namely:—

(1) quarrying of the required stones,

(2) moving of the stones, blocks and boulders to the desired spot,

(3) erection of the orthostats in their proper places and drystone walling round the cist,

(4) placing of the capstone or cover-slab on the cist,

(5) placing and arrangement of granite boulders so as to form a stone or boulder-circle.

As already suggested (p.59) quarrying could only be done at a place close to the burial site. The stones and the boulders for the circle or circles must have been rolled down from the granite hill slopes. The slabs were probably obtained by lighting a fire on the surface of the rock with a view to loosening the top layer by physical expansion and contraction along a horizontal plane and then inserting wedges into the line of cleavage. This was not difficult since weathering had prepared the rock for the cleaving process.

The slabs were set up in such a way that one end of each slab projected laterally across the end of one of the adjacent slabs, thus forming a sort of swastika, either anti-clockwise or clockwise. This is supposed by some to be a device of symbolic significance (Ghurye, 1926), but in fact it is hardly more than a constructional necessity. It locked the four sides together and prevented an inward collapse of the orthostats.

Another curious feature is worth mentioning. Each cist formed by slabs is surrounded by a dry-stone wall which reaches almost to the level of the capstone and, on plan, exhibits a spiral arrangement.

Where double stone-circles occur, as at Brahmagiri, enclosing a pit or a cist, as the case may be, the space between the outer and the inner circles is closely packed with rubble. The two details, just mentioned, are of course visible only after excavation.

The port-hole is an invariable accompaniment to the megalithic cist. In northern and western Europe it was made by striking out semi-circular notches in the edges of two adjacent uprights, but in the Crimea, Caucasia, Syria and India it is a circular hole cut in the eastern orthostat.

It is difficult to explain the occurrence of the port-hole as a feature common to the megalithic cists of both east and west. "A hole is a hole all the world over and we are not likely to make any discoveries by comparing the apertures themselves" (Kendrick, 1925). Nevertheless it has often been argued that the western and eastern cultures are connected because of this feature. On the other hand, the view is held that the megalithic structures of Africa, India, Indonesia and Japan have very little in common with the burial chambers of prehistoric Europe (Daniel, 1941, p.5). Leaving aside Indonesia and Japan, the apparent affinity of the near Eastern and Indian megalithic monuments with those of Europe cannot be summarily discounted, and the port-hole has often been quoted as proof of such affinity.

The view of Leeds (1920) that the megalithic idea was carried across the world by a single race migrating from place to place; and of Taylor

(1852) that the megalithic remains belonged to the Celtic-Scythians, can no longer be seriously maintained. Judged by the contents, the tombs in question do not belong to a single culture and therefore were not erected and used by a single people (Childe, 1950a).

In northwest Europe the port-hole is inseparably connected with the threshold or entrance idea (Kendrick, 1925). Whether the Indian examples were intended for the introduction of later sepulchral urns when occasion required, or for blowing incense through long tubes (Walhouse, 1874), or for passing food (Peet, 1912), or providing an outlet for the soul, is a matter for speculation. Referring to the port-holes of Brahmagiri, Wheeler (1948) suggests that the bones which had to be deposited in the cist were thrown through them.

Daniel (in Clifford and Daniel, 1940) restricts the term port-hole only to the European examples because they are fairly large. To those of India and Palestine he applies the term '*ghost-hole*' because of their small size. This classification cannot be maintained in India because fairly large-sized port-holes do occur there. One of the cists at Savandurga in the Bangalore District, for instance, has a port-hole large enough for a man to pass through. Some of the cists in Hyderabad also have large port-holes.

D. GRAVE GOODS

The grave goods comprise pottery, iron objects, stone objects and beads. Since the stone tools, which are of the greatest interest in the present context, play but a subsidiary role, it is necessary to comment briefly on the other material also.

Pottery.—Foote (1914 and 1916) refers to the megalithic pottery vaguely as 'Iron Age' pottery. Broadly it falls into two categories, coarse unpolished ware, which largely consists of urns and storage jars, and fine polished ware. A cist at the village of Managondahalli produced a large storage jar, 3 feet in height with an ornamental band at the neck.(1) Some grain was actually collected in an excavated cist-circle in Mysore from such pottery vessels (Bain, 1890). The thick elephantine-legged, coarse, unpolished vessel found in the megalithic tombs is, of course, a burial urn

The fine polished ware is often red and black; some pots are entirely black. The red-and-black effect was perhaps not intentional, being the result of unequal firing. The exposed part of the pot acquired the red colour owing to oxidation of the iron contained in the clay. Generally the lower portion of the vessel is red, while the upper portion is black, owing to contact with the reducing atmosphere produced by the burning fuel, the vessel being inverted during the firing. The black polished ware, distinctive of the pit-circles, was produced by low temperature firing and therefore weathers much more easily than the red.

It is interesting to note that the pottery types of the pit-circles and of the cist-circles are somewhat different. Lids with many sub-types, as opposed to small knobbed lids of the cists, appear to be more common in the pit-circles. Those found by Wheeler at Brahmagiri have interesting parallels

(1) Annual Report of the Archaeological Department, Mysore, 1917

from other sites. No. 1286 of Foote from Chikjala in the Bangalore District is almost a replica of Wheeler's P.4 (1948, fig. 13). Nos. 2605d and 2605e (Foote, 1916, Pl. 66) from the Cache at Patpad, Kurnool District, are mere variants of Wheeler's P.4 and P.5 No, 1231 from Guntakal (Foote, 1901, Pl. XXXIII) is a variant of Wheeler's P.1, P.1a and P.1b.

Some interesting specimens of pottery were recovered from the cists at Savandurga and Chikjala in the Bangalore District. Two specimens resemble a horn or gourd and are hollow (see Raghavan, 1935). Bruce Foote (1901) suggested that they were used as seed boxes, an unlikely interpretation. This type is unknown from Brahmagiri.

The thick-rimmed and wide-mouthed pots and pans from Huttanhalli, 18 miles north of Bangalore, are somewhat similar to these of Brahmagiri.

Footed vessels are one of the most widely distributed pottery types from the megalithic tombs of South India. The localities from which they have been recovered in Mysore State are as follows (distribution map, Pl. V):—Brahmagiri, Chandravalli, Talya, Managondahalli, Chikjala, Savandurga, Bellandur, Garudanahalli, Huttanhalli.(1)

The megalithic tombs also contain miniature pottery. Fergusson (1872) believed that the presence of miniature pottery was an indication of the pygmy stature of the race of people who were responsible for the burials. The miniature vessels are not, however, found in miniature tombs but in megalithic tombs and structures of normal size (Walhouse, 1875). Besides, they are found side by side with large-sized pottery. They form a regular part of grave furniture and contain in all probability, some offering. It is possible, for instance, that they were perfume containers or scent bottles for the dead.(2) The miniature cups Nos. 21 and 23 from Savandurga cists resemble Odagattur No. 317—1923.

Graffiti on megalithic pottery are common(3) but they occur also on urn burial pottery (Laffitte, 1931). These marks have been differently interpreted by different writers. Foote (1916) and Richards (1924a) are of the opinion that they represent ownership marks. That they were the personal marks of the dead cannot be accepted because the same marks are found on pottery widely separated by distance. For instance, Dubreuil saw on the burial pottery at Calicut "mark 14" of the Pondicherry urns. Yazdani (1917) who classified 131 different forms of these marks put forward the theory that they were the sources of the Brahmi script. It seems on the other hand that they are merely post-firing scratchings recorded by Wheeler (1938).

Iron objects:—The megalithic cists and pit-circles in Mysore contain, as part of the grave goods, a large number of iron objects. The axes, chisels, sickles, swords and arrowheads from Jala and Savandurga in the Bangalore District have been catalogued by Foote (1901). Mr. Bain (1890) who opened 3 stone circles in the Mysore country (the name of the site is not specified) found in the cist two swords crossed upon each other. Swords in a similar

(1) Annual Report of the Archaeological Survey of India, 1930-34, Pl CXXIX, 1-8 A small 4-footed bowl with a railing ornamentation at the neck was found

(2) Nos. 1305, 1307 and 1311 (Foote, 1901).
No. 313—1923 (Indian Section of the Victoria and Albert Museum) is a black burnished miniature vase from Odagattur

(3) Hunt (1916 and 1924) found them on the Hyderabad megalithic pottery. F J Richards (1924a) observed some of them on the pottery which he excavated from three stone circles at Odagattur, North Arcot District Aiyappan (1933) noticed some of the marks on the pottery of the rock cut cave tombs of Ferske, southern Malabar

position were found in the megalithic tombs at Guntakal. Since the skeletal remains were found by Bain beneath the crossed swords, some kind of ceremony is suggested. At Savandurga Col. Branfill (1881a) found iron arrowheads stuck into the ground in an upright position, which again implies the performance of some rite. Wanchope opened a few megalithic tombs at Huttanhalli, which yielded iron celts and spearheads. A celt 10½ inches long, 5¼ inches (maximum) broad, has a pointed projection on each side just above the cutting edge. It resembles the copper celts of Gungeria in the United Provinces (Mazumdar, 1936).

The cists and pit-circles of Brahmagiri yielded, apart from 20 fragmentary and much-decayed objects, 7 tanged daggers, 4 wedge-shaped blades, 4 chisels, 2 sickles, 2 lances, a sword, a barbed arrowhead, a chopper-like object with a long handle and 3 spears 5½ - 6½ ft. long. From the cists came 6 tanged daggers, an axe, a fragmentary chisel, besides a few unidentified fragments.[1]

This abundant association of iron with the megaliths of Brahmagiri is regarded as being connected with a wave of invaders who came to northern Mysore when the Maurya Empire was breaking up (Wheeler, 1948). If this invasion-theory is correct, the megalithic culture may have spread to central and eastern Mysore from the north. This idea is supported by the magalithic culture of Chandravalli which is chronologically later than that of Brahmagiri, as is indicated by the discovery of Andhra coins near the megalithic burials (Krishna, 1929). Chandravalli may therefore represent a further step or stage in the southward expansion of the megalithic folk. This evidence again supports the view that the megalithic culture was a period of considerable duration, and that its sites should not be regarded as contemporaneous everywhere.

Beads:—Beads are commonly found in both megalithic and urn burials of South India.[2] Thus Col. Tucker found carnelian beads in a cist at Sulur, 7 miles east of Podunur in the Palladam Taluk of the Coimbatore District. Many beads were recovered from the cists and pit-circles at Brahmagiri. The megaliths IV and VIII yielded magnesite beads of various shapes. Magalith VI and pit-circle No. 2 contained terracotta beds. Megalith IX was remarkable since from it were recovered, in addition to 33 gold beads, two made of steatite and serpentine respectively.

The stone raw materials used for bead making in the Megalithic phase of Mysore were carnelian, magnesite, steatite and serpentine. Of these only the first is a very hard substance, and the last two are soft and easy to grind.

But metal and terracotta beads are already present. Evidently, the art of stone-polishing was beginning to suffer from competition by the metal worker and the potter. The substitution of more easily produced articles was going ahead in the megalithic period, and stone was being replaced.

Artifacts (other than beads:)—Rea (1912; 1915) found a polished stone celt[3] in one of the pottery cists from a stone circle near the reserved forest area

(1) Nos 1272, 1273, 1274, 1275 and 1276 of Foote (1901) refer to iron implements from the megaliths of Chikjala, and Nos 1330 to 1349 to those from the cist-circles of Savandurga in the Bangalore District, respectively

(2) Indian number of 'Man' (1930)

(3) See plate XXXIII, No 24 (1912) It measures 4 ins x 1¾ ins and has a pointed-butt.

of Perambair, Chingleput District of Madras Presidency. Numa Lafitte (1931) found stone axes in an urn-field near Pondicherry. Cammiade (1924) collected a few microliths from burial urns in the region of the Godavari. Two small crystal scrapers were found by Branfill (1881a) in a megalithic cist at Savandurga in the Mysore State. Apart from these few examples of stone implements, the stone objects of the megalithic burials are usually confined to mortars and pestles. The granite pestle from the pit-circle at Brahmagiri (Megalith II, No. 12, Pl. CXVI, Wheeler, 1948) resembles the well-polished diorite pestle which is nearly 12 inches long (No. 324-1923 I.M.) and which comes from Odagattur in the Madras Presidency and is in the Indian section of the Victoria and Albert Museum, London, with other objects from Chagattur. Similar stone objects have been obtained from the megalithic burials of Jala in the Mysore State. No. 1278 and No. 1280 of Foote's Plate XXI (1901) are a pestle of hornblende and a mortar of the same material, respectively.

Of these stone artifacts, the polished celts are the most important, for they provide a link with the preceding " neolithic " culture. They are exactly of the same pointed-butt type as in this culture, and very few have been found. One might, therefore, hold the view that these are stray specimens which, on megalithic sites superimposed on neolithic sites, intruded accidentally into the megalithic level. But in spite of the scarcity of such specimens this view is hardly tenable, for one of them was found inside a megalithic urn near Pondicherry and another inside a pottery cist at Perambair.

There is no doubt, therefore, that these axes were used by megalithic people. It is a very different question, however, whether they were made by them It is quite conceivable that these are neolithic specimens picked up by the megalithic people and to which some magical value was attached. This is indeed the case in many parts of the world today, where polished stone celts are regarded as thunderbolts or other missiles of the gods And in Mysore and other parts of southern India there are enough polished celts lying on the surface to attract attention

The stone industry of the megalithic builders, therefore, may no longer have included the making of celts Microliths are likely to have continued on a small scale, as they have in other iron-using communities, for instance in South or East Africa. Stone remained the cheaper raw material long after the introduction of iron

On the whole, however, one notices that the megalithic people specialised in working stone in the following cases:—

(a) beads continued to be made.

(b) mortars, etc., appear, which take advantage of properties of stone that are lacking in the metals.

(c) architectural use is made of stone in the erection of the megaliths.

The megalithic civilization was thus drifting away from the use of stone for weapons and tools. It discovered new uses for stone, above all in the introduction of architecture, which in the course of the following centuries was destined to become the chief manner of using this raw material in southern India. This trend was, of course, the direct result of the development of iron implements. These were on the whole more efficient than stone tools, and they enabled man to work stone on a large scale for architectural purposes.

E. THE AGE OF THE MEGALITHS

The theories concerning the origin of the megalithic culture have a bearing on the chronology of the megaliths. Whether it was basically western as Penka, Kossinna, S. Reinach and Leeds believed or was an eastern idea as S. Muller and Montelius thought, need not be discussed here. Elliot Smith (1913) considered that the Egyptian mastaba was the parent of the dolmen. Peake (1916) suggested an Aegean origin for them. Perry's theory (1915) that the megalithic monuments were the work of the Egyptian traders, who went in search of pearls, gold and copper is not tenable because the distribution of the megaliths does not always coincide with the areas of distribution of those commodities.

Hunt (1924) revived the question of Egyptian affinities by equating some pottery marks with Egyptian 'K'; Walhouse (1874) on the other hand pointed to affinities with Etruria. These views only show how inconclusive the evidence still is. One is not entitled even to assume a common origin for all megalithic cultures. Those of Europe and North Africa may belong to one complex, and those of India to another. In any case, as will be shown in the following paragraphs, the Indian megaliths are about 1500 years younger than those of Europe, a difference which does not strengthen the hypothesis of common origin.

Indian legends connected with the megaliths are chronologically misleading, implying an unduly early date. For instance, most of the South Indian megaliths are called 'Pandukulis.' They are associated with the Pandava brothers of the Mahabharata. There is no evidence to show that the megalithic burial custom originated with the Pandavas or was in vogue during the period of their regime.

At one time it was the fashion to assign the Indian megaliths to a prehistoric period. Some writers even now give them an early date. References in the Rigveda have led Panchamukhi (1946) to suggest a date between 1200-1000 B.C Dubreuil was of the opinion that the rock-cut tombs of Malabar with their hollow cave of hemisperical shape and a central opening like a chimney were survivals of a Vedic fire-altar. The Vedic evidence, however, needs far more careful examination but archaeological evidence points to the conclusion that most of the megaliths in South India are assignable to the period between the 4th century B.C. and the early centuries of the Christian era. The arguments in favour of this date are as follows:

1. As has been pointed out on p.67 most of the megaliths are associated with a fully developed series of iron weapons and implements: spears, swords, daggers, sickles, chisels and axes. Some of this equipment looks almost modern. An object of steel without any corrosion was recovered from one of the cists at Savandurga in the Bangalore District by Branfill. One hesitates to assign to them an early age, a view which is also held by Gordon (1952).

2. Some punch-marked coins have been reported from megalithic burials in the Coimbatore area (Wheeler, 1948, p.300, No. 4). Their date is known to range, according to Allan, between the 6th and 3rd centuries B.C. Most of the other evidence also points to a date later than the 6th century, so that this value must be regarded as a *terminus post quem.*

3. The problem of the so-called russet-coated Andhra ware deserves to be discussed in this connection (see Pl. IVB and for a full list of the sites of this particular ware see *Ancient India* (1947) No. 4, p.308). At Chandravalli, Brahmapuri, Kondapur and a few other sites, this ware is associated with the heavy lead coins of the Andhras and their feudatories as well as with the "rouletted" ware of Arikamedu. Its date therefore has been rightly assigned to the first century A.D., at least in so far as it must have been used in that century. It may, however, be earlier or later also.

This pottery has certain features in common with the megalithic pottery:—

(1) It is found in association with the usual red-and-black ware.

(2) In form and shape it corresponds to the red-and-black ware.

(3) Like the red-and-black pottery it bears post-firing graffiti.

On a restricted scale it occurs in the megalithic tombs, the Coimbatore District being its stronghold. Walhouse (1875) found this type at Nallampatti, 6 miles north-northwest of Perundruai, which lies south-west of Erode; Macqueen at Rakiapalayam and Tucker at Sulur (Beck, 1930)—all in the Coimbatore District. Foote (1901) also found it in the Coimbatore, Travancore and Tinnevelly Districts (Nos. 1076: cup; 1077, 1085, 1086, 1087, 1088, 1089, 1092, 1120-1123, 1151i, 1151g, 1151h, 1151j, 1151x, 1151y: bowls; 1084: vase; 1111 to 1119: pot (Chatty); 1151a: pot (Chatty) and 1001 bowl).

The Indian section of the Victoria and Albert Museum has a number of specimens of russet-coated ware with wavy lines. No. 5762-1901 is a bowl which is red outside and black inside. The red outside has wavy horizontal bands in yellowish white (Kaolin). No. 5761-1901 (refers to registration numbers of the V. and A. Museum) is a similar carinated vase, but with straight parallel horizontal bands. No. 5759-1901 is also a carinated vase but with wavy design. All these belong to the megalithic graves of Coimbatore District. No. 08078 I.S. is a fine carinated bowl with the wavy bands but its provenance is not known. The label says that it comes from a stone-circle in South India.

Govinda Menon (1937), discovered similar russet-coated ware in a megalith at Tiruvilvamala, in Cochin State. Lastly, Dr. Krishna (1942a) recovered a vase of this type of pottery with lattice design in kaolin from one of the megaliths at Brahmagiri.

Col. Tucker's evidence from Sulur, 7 miles east of Podanur in the Palladam Taluk, Coimbatore District, is particularly valuable because the megalithic cist which contained the russet-coated ware yielded also a bronze coin, which was identified by J. Allan of the British Museum as one of Eran, of the 3rd century B.C. This evidence suggests that "Andhra" pottery may have been made as early as the third century B.C., and its range was from *c.* 300 B.C. to *c.* 100 A.D.

On Andhra pottery evidence, therefore, the megalithic period would have extended into the first century A.D., though the presence of such pottery need not always imply so late a date.

4. The megaliths of Chandravalli, judged by their pottery, appear to be different from those of Brahmagiri. They may perhaps correspond to the latest megalithic phase of Brahmagiri. Salt-glazing is common at Chandravalli and absent at Brahmagiri. Wheeler (1948) points out that this glaze is frequent in Andhra pottery, indicating a late age, perhaps up to the first century A.D.

Chandravalli therefore appears on the whole to be later than most of Brahmagiri, where the Andhra pottery phase is preceded by the "Megalithic" pottery phase indicating a considerable period of megalithic building prior to Chandravalli.

5. Coin evidence suggests that megaliths were in fact still constructed in the first century A.D. At Chandravalli, Dr. Krishna (1929) discovered Andhra lead coins of that century. Wheeler (1948) further reports that a Coimbatore collector is believed to have found a silver coin of Augustus in a megalithic tomb. This doubtful piece of information agrees with the remainder of the evidence.

The preceding arguments have been selected as based on material finds made in the megaliths themselves. Taken as a whole, they suggest that the megalithic period ranges from the 6th century B.C. to the 1st century A.D. Whether this will prove to be the latest date remains to be seen, for there is some literary evidence suggesting that megaliths continue to be built even later.

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Fig. 6. Pointed flake.

Figs. 7 and 8. Scrapers.

Fig. 9. Fabricator.

Figs. 10 and 11. Cores.

PLATE VIII. Palaeolithic implements from Mysore State compared with those from other Indian localities (¼ nat. size).

Fig. 1. Hand-axe (No. 211) from Nidaghatta.

Figs. 2 and 6. Hand-axe (No. 207) and chopper (No. 208) from Jyankal.

Figs. 3, 4, 5, 8 and 10. Hand-axes (Nos. 217, 219, 220, 213 and 216, respectively) from Lingadahalli.

Fig. 7. Ovate (No. 202) from Karadigudda.

Fig. 9. Ovate (No. 215) from Lingadahalli.

Fig. 11. Hand-axe (No. AV III, 5) from Vadamambakkam, near Arkonam, Madras Province.

Fig. 12. Hand-axe (No. AT III, 51) from Attirampakkam, Madras Province.

PLATE IX. Palaeolithic artifacts from Mysore State compared with those from other Indian sites (¼ nat. size).

Figs. 1 and 2. Disc-like chopping-tools from Lingadahalli (No. 222 and Attirampakkam, Madras Province (No. AT 88), respectively.

Figs. 3 and 4. Hand-axes from Talya (No. 204) and Attirampakkam, Madras Province (No. AT III, 38), respectively.

Figs. 5 and 6. Hand-axes from Kadur (No. 226) and Attirampakkam, Madras Province (No. AT III, 32), respectively.

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PLATE X. Palaeolithic artifacts from Mysore State compared with those from other Indian sites (¼ nat. size).

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Figs. 4, 5 and 6. Discs from Nidaghatta, Mysore State (No. 209), Kilkuppam, near Arkonam (No. AV II, 17) and Ichchiputtam, near Arkonam, Madras Province (No. AV I, 4), respectively.

Figs. 7 and 8. Hand-axes from Lingadahalli, Mysore (No. 212) and Attirampakkam, Madras Province (No. AT III, 54), repectively.

Figs. 9 and 10. Choppers from Lingadahalli, Mysore (No. 218) and Vadamambakkam, Madras Province (No. AV III, 3), respectively.

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PLATE XI. Palaeolithic artifacts from Mysore State compared with those from other Indian sites (½ nat. size).

Figs. 1 and 2. Discs from Nidaghatta, Mysore (No. 210) and Attirampakkam, Madras Province (No. AT I, 143), respectively.

Figs. 3 and 4. Hand-axes from Jodikatte, Mysore (No. 203) and Kilkuppam, near Arkonam, Madras Province (No. AV II, 16), respectively.

Figs. 5 and 6. Ovates on flakes from Lingadahalli, Mysore (No. 223) and Attirampakkam, Madras Province (No. AT III, 191), respectively.

Figs. 7 and 8. Chopping-tools from Nyamati, Mysore (No. 224) and Khyad, Dharva District (No. 32), respectively.

PLATE XII. A. Fabrication of microliths. The notch method. (After Rankine, 1951).

B. Rejuvenation of microlithic cores:—

1. Lateral trimming.
2. Apical trimming.
3. Basal trimming.

(After Rankine, 1951).

C. Reconstruction of the use of microliths as arrowheads. (After Leakey, 1950).

PLATE XIII. Microliths from Jalahalli, Mysore State, collected by Todd (Coll. British Museum).

Figs. 1-8. Petits tranchets and tranchet-like lunates.

Figs. 9-40. Points blunted on the left.

Figs. 41-46. Points blunted on the right.

Figs. 47-51. Drills.

Figs. 52-58. Triangles.

Figs. 59-62. Burins.

Figs. 63-66. Blades.

The following numbers preceded by T refer to Fig. 2 in Todd (1948) and the original specimens that could be located and drawn for the present publication are indicated.

T1	= Fig. 4	T28	= Fig. 53	T43	= Fig. 27
T2	= ,, 3	T29	= ,, 51	T44	= ,, 49
T3	= ,, 5	T32	= ,, 25	T49	= ,, 66
T5	= ,, 1	T33	= ,, 26	T50	= ,, 64
T6	= ,, 6	T34	= ,, 55	T51	= ,, 65
T7	= ,, 2	T35	= ,, 13	T52	= ,, 63
T9	= ,, 7	T38	= ,, 54	T53	= ,, 59
T27	= ,, 52	T42	= ,, 47		

PLATE XIV. Microliths from Jalahalli, Mysore State, collected by Todd (Coll. British Museum).

A. Scrapers.

B. Lunates.

The following numbers preceded by T refer to Fig. 2 in Todd (1948) and the original specimens that could be located and drawn for the present publication are indicated.

T18 = Fig. B7
T25 = „ B4
T55 = „ A10
T56 = „ A2
T57 = „ A8
T58 = „ A13

PLATE XV. Microliths from Bangalore, Mysore State.

Figs. 1 and 3-15. Points.

Fig. 2. Irregular triangles.

Figs. 16-19. Lunates.

All from Bangalore-Sarjapur Road.

Figs. 20-30. From the Hindustan Aircraft Factory Site.

PLATE XVI. Scrapers from the site near the Bangalore-Sarjapur Road, Bangalore.

PLATE XVII. Microliths from Brahmagiri, Mystore State. Surface finds made by the writer.

A. Pre-I industry. Figs. 1-7. Scrapers and used flakes.

B. IA-B industries.

Figs. 1-5 and 10-12. Parallel-sided blades, 2 and 4 with use-marks.

Fig. 6. Blunted-back blade.

Fig. 7. Point.

Fig. 8. Core.

Fig. 9. Bladelet.

PLATE XVIII. Microliths from Kibbanahalli, Mysore State.

PLATE XIX. Polished stone implements from Brahmagiri, Mysore State (½ nat. size).

Fig. 1. Small adze.

Fig. 2. Chisel.

Fig. 3. Axe of Ia type. Surface find made by the writer. Classified as adze/axe in this publication.

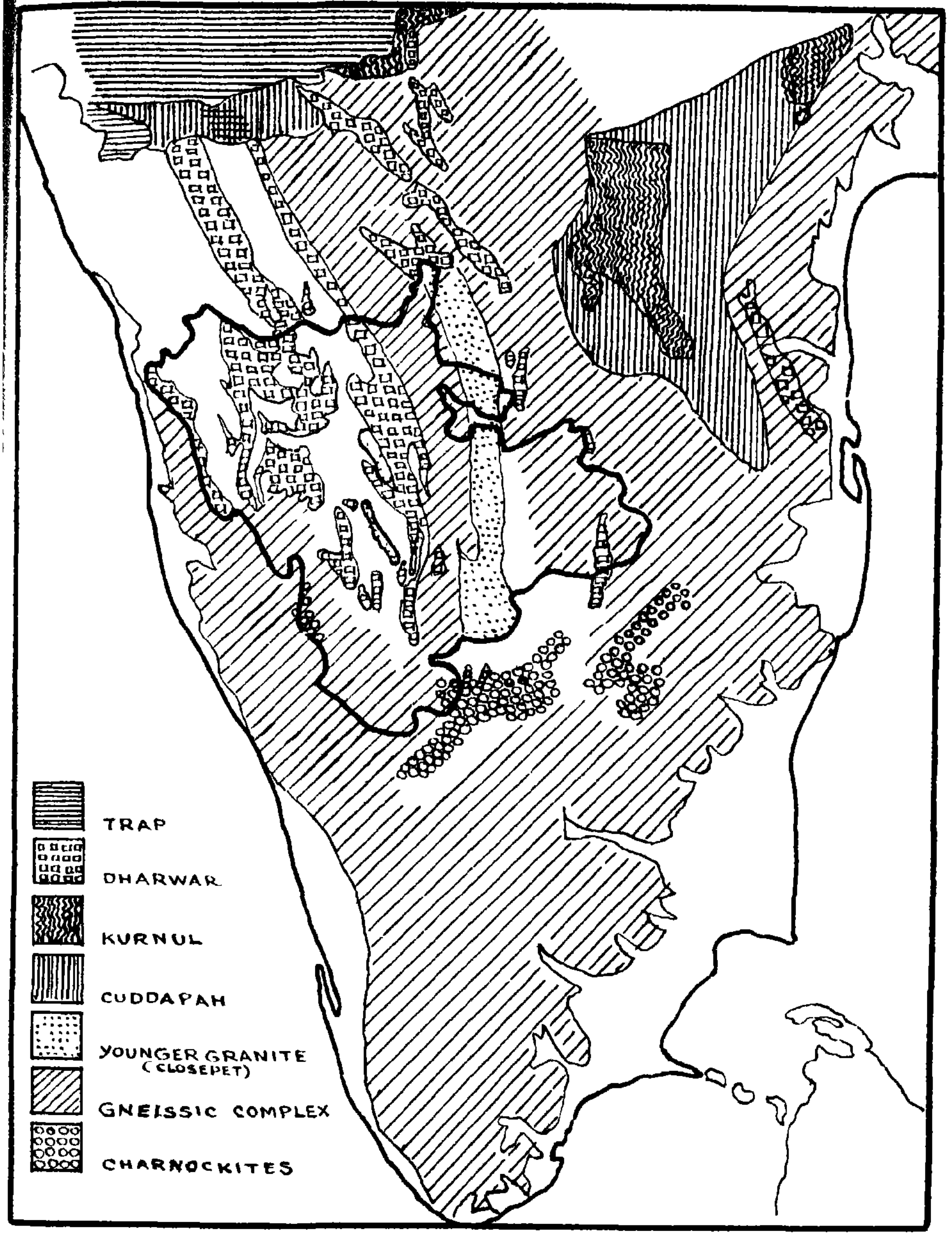
PLATE XX. Polished stone axes from Brahmagiri. Surface finds made by the writer. (½ nat. size).

Fig. 1. Illustrating Stages C and D (retouching and pecking) in the manufacture of polished stone axes.

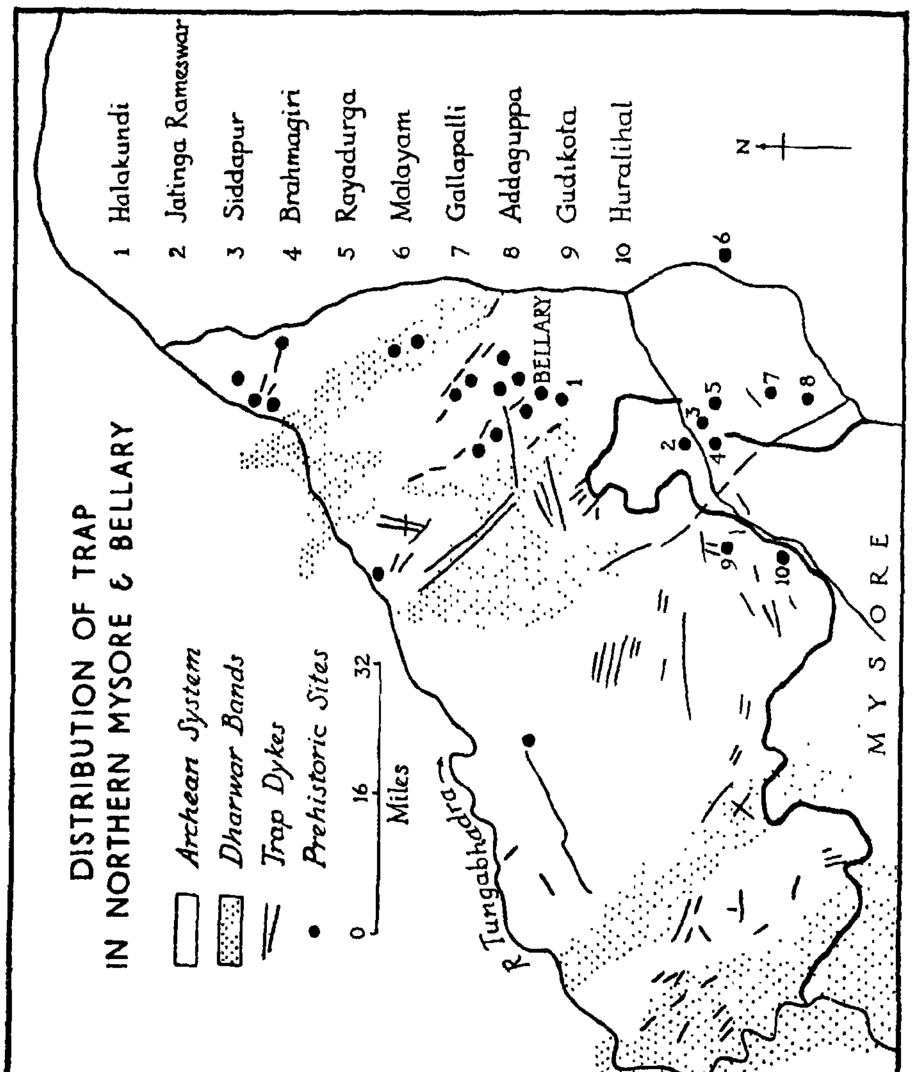
Fig. 2. Axe resembling Wheeler's type AIIa, but with very rounded cutting edge.

Fig. 3. Axe resembling Wheeler's type BIa.

Plate I



Geological sketch map.


DISTRIBUTION OF TRAP
IN NORTHERN MYSORE & BELLARY
Archean System
Dharwar Bands
Trap Dykes
Prehistoric Sites
0 16 32
Miles
R Tungabhadra
BELLARY
MYSORE
N
1 Halakundi
2 Jatinga Rameswar
3 Siddapur
4 Brahmagiri
5 Rayadurga
6 Malayam
7 Gallapalli
8 Addaguppa
9 Gudikota
10 Huralihal

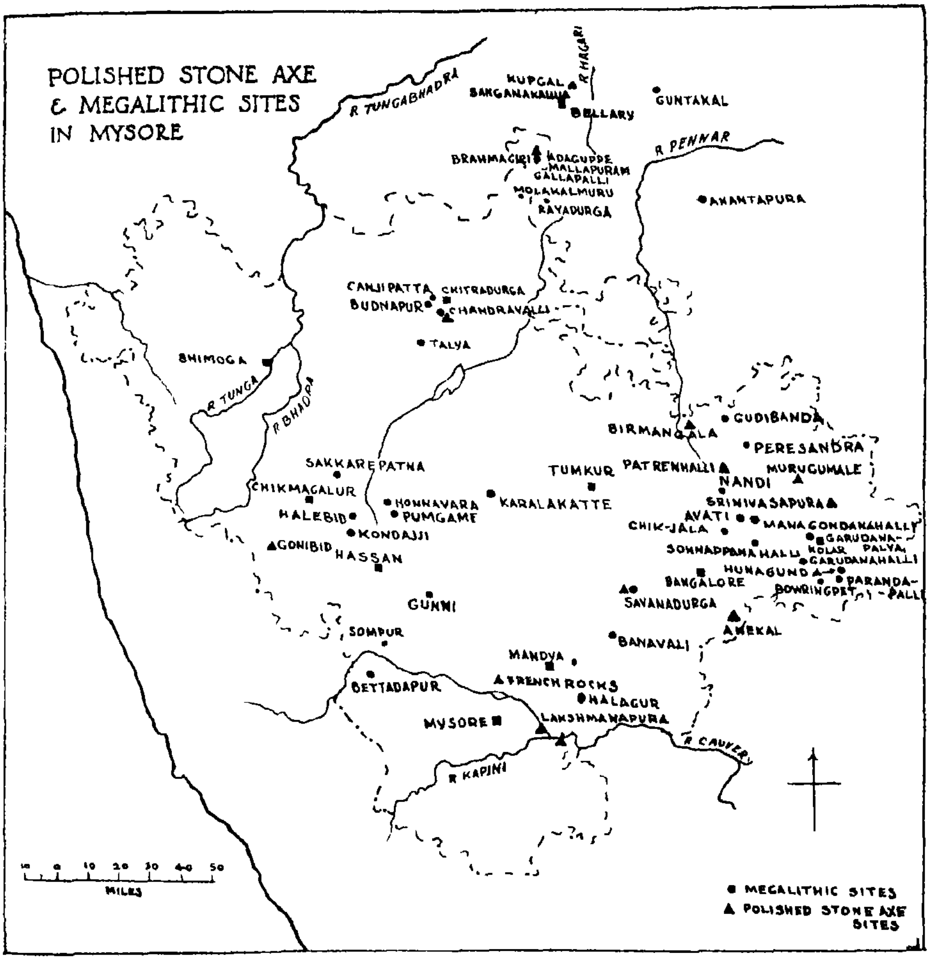
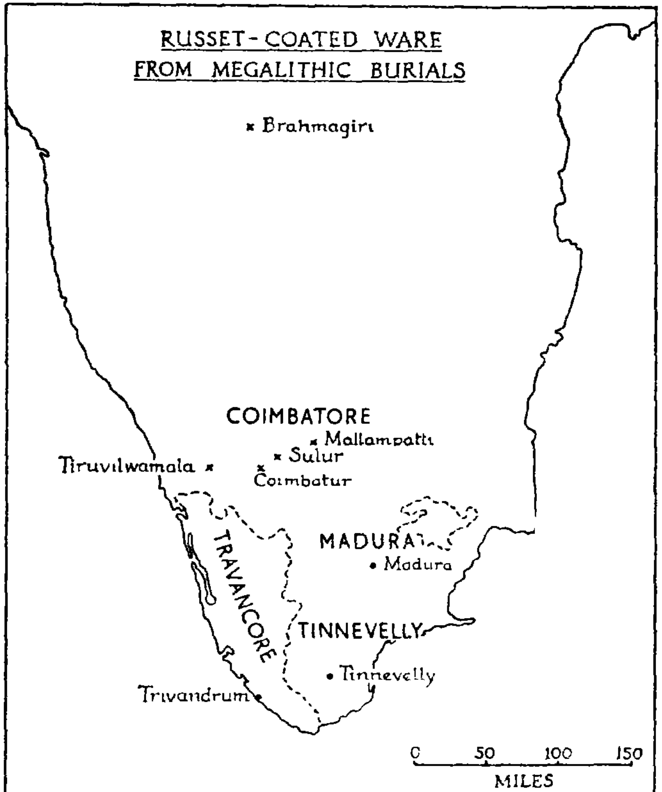
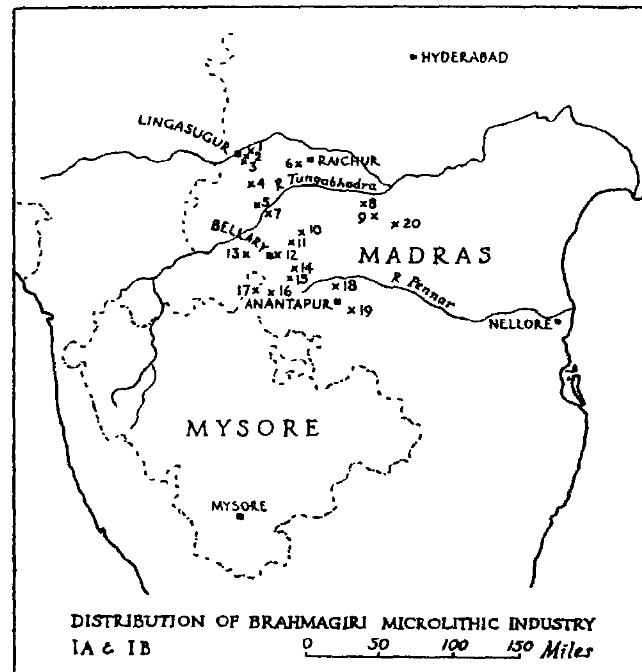

POLISHED STONE AXE
& MEGALITHIC SITES
IN MYSORE
R TUNGABHADRA
R HAGARI
KUPGAL
SANGANAKALLU
BELLARY
GUNTAKAL
R PENNAR
BRAHMAGIRI
MALLAPURAM
GALLAPALLI
MOLAKALMURU
RAYADURGA
ANANTAPURA
CHITRADURGA
CHANDRAVALLI
BUDNAPUR
TALYA
SHIMOGA
R TUNGA
R BHADRA
SAKKAREPATNA
CHIKMAGALUR
HALEBID
HONNAVARA
PUMGAME
KONDAJJI
GONIBID
HASSAN
KARALAKATTE
TUMKUR
BIRMANGALA
GUDIBANDA
PERESANDRA
PATRENHALLI
NANDI
MURUGUMALE
SRINIVASAPURA
AVATI
CHIK-JALA
MANAGONDANAHALLI
KOLAR
BANGALORE
HUNAGUNDA
BOWRINGPET
SAVANADURGA
ANEKAL
GUNNI
SOMPUR
BANAVALI
MANDYA
BETTADAPUR
FRENCH ROCKS
HALAGUR
LAKSHMANAPURA
MYSORE
R CAUVERY
R KAPINI
10 0 10 20 30 40 50
MILES
● MEGALITHIC SITES
▲ POLISHED STONE AXE SITES

Plate IV


RUSSET-COATED WARE
FROM MEGALITHIC BURIALS
Brahmagiri
COIMBATORE
Mallampatti
Sulur
Coimbatur
Tiruvilwamala
MADURA
Madura
TRAVANCORE
TINNEVELLY
Tinnevelly
Trivandrum
0 50 100 150
MILES

B


HYDERABAD
LINGASUGUR
RAICHUR
R. Tungabhadra
BELLARY
MADRAS
ANANTAPUR
R. Pennar
NELLORE
MYSORE
MYSORE
DISTRIBUTION OF BRAHMAGIRI MICROLITHIC INDUSTRY
IA & IB
0 50 100 150 Miles

A

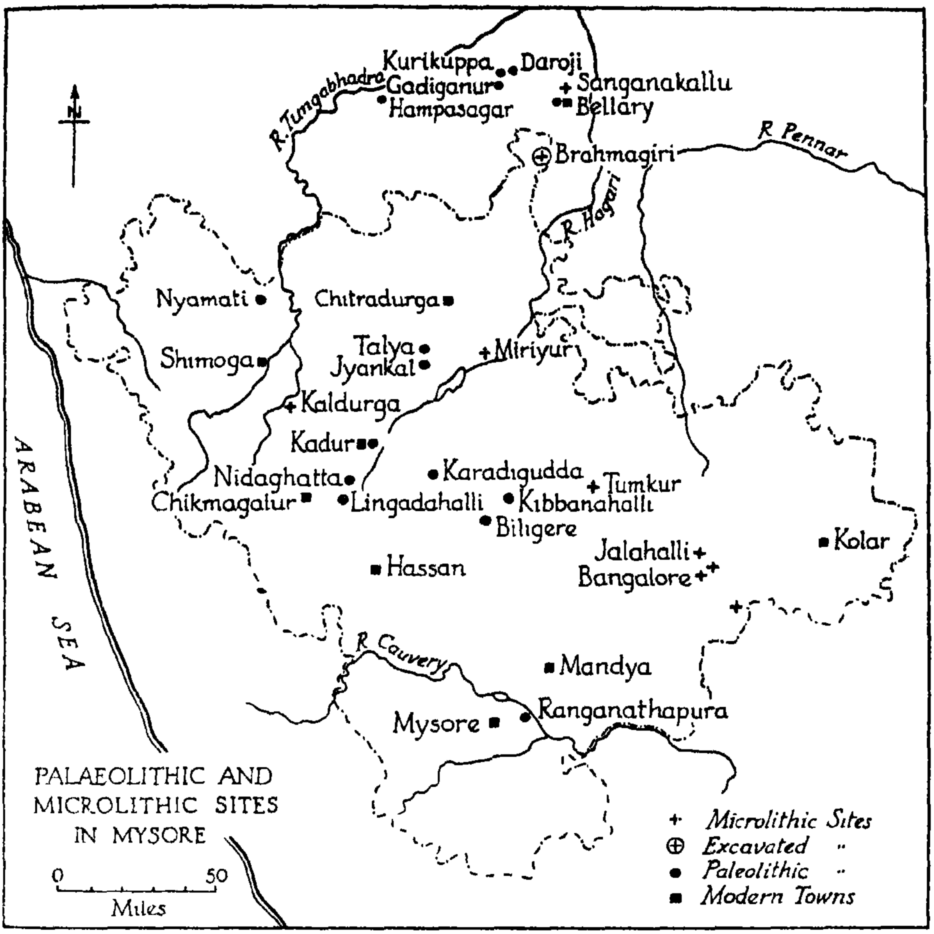
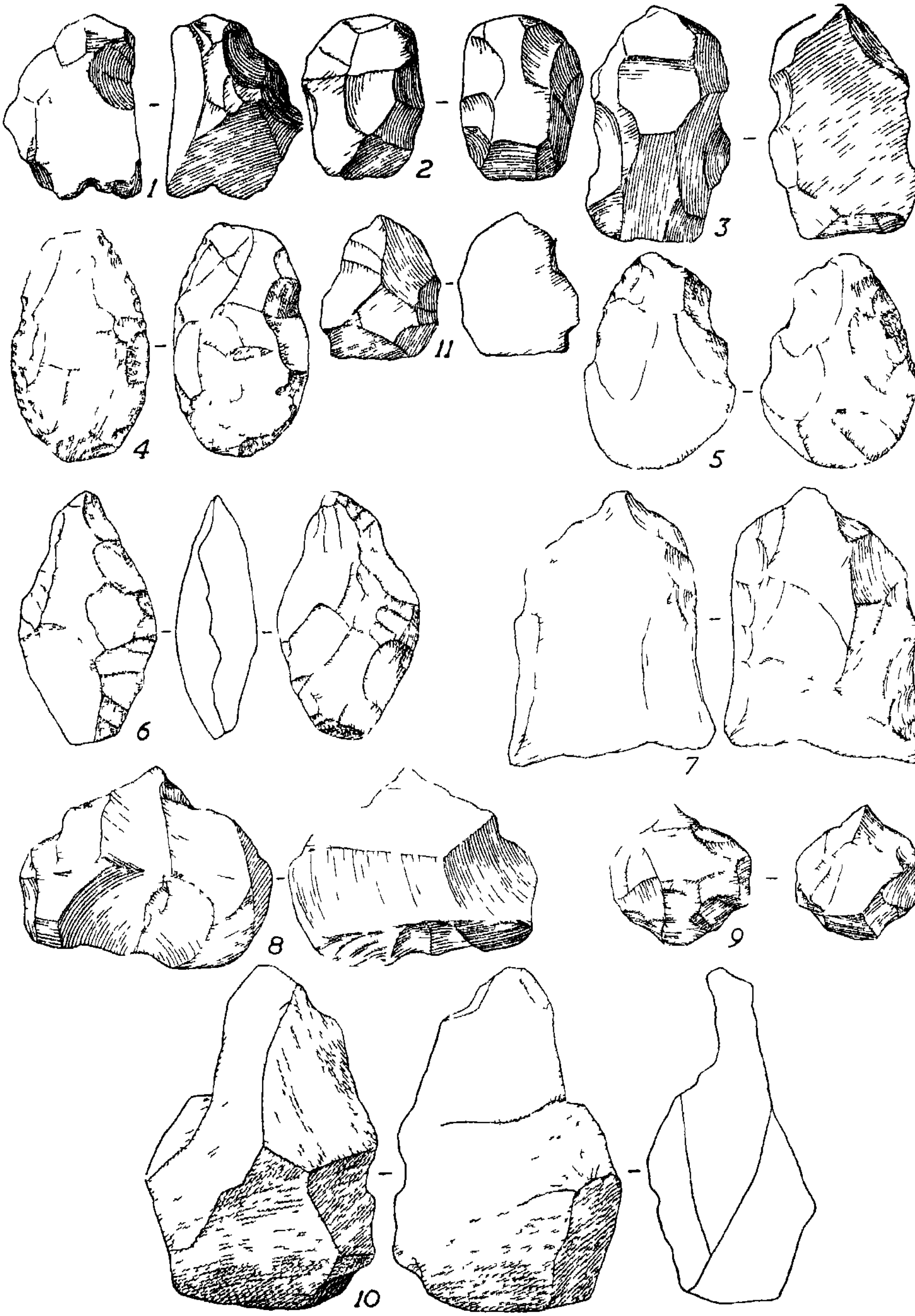
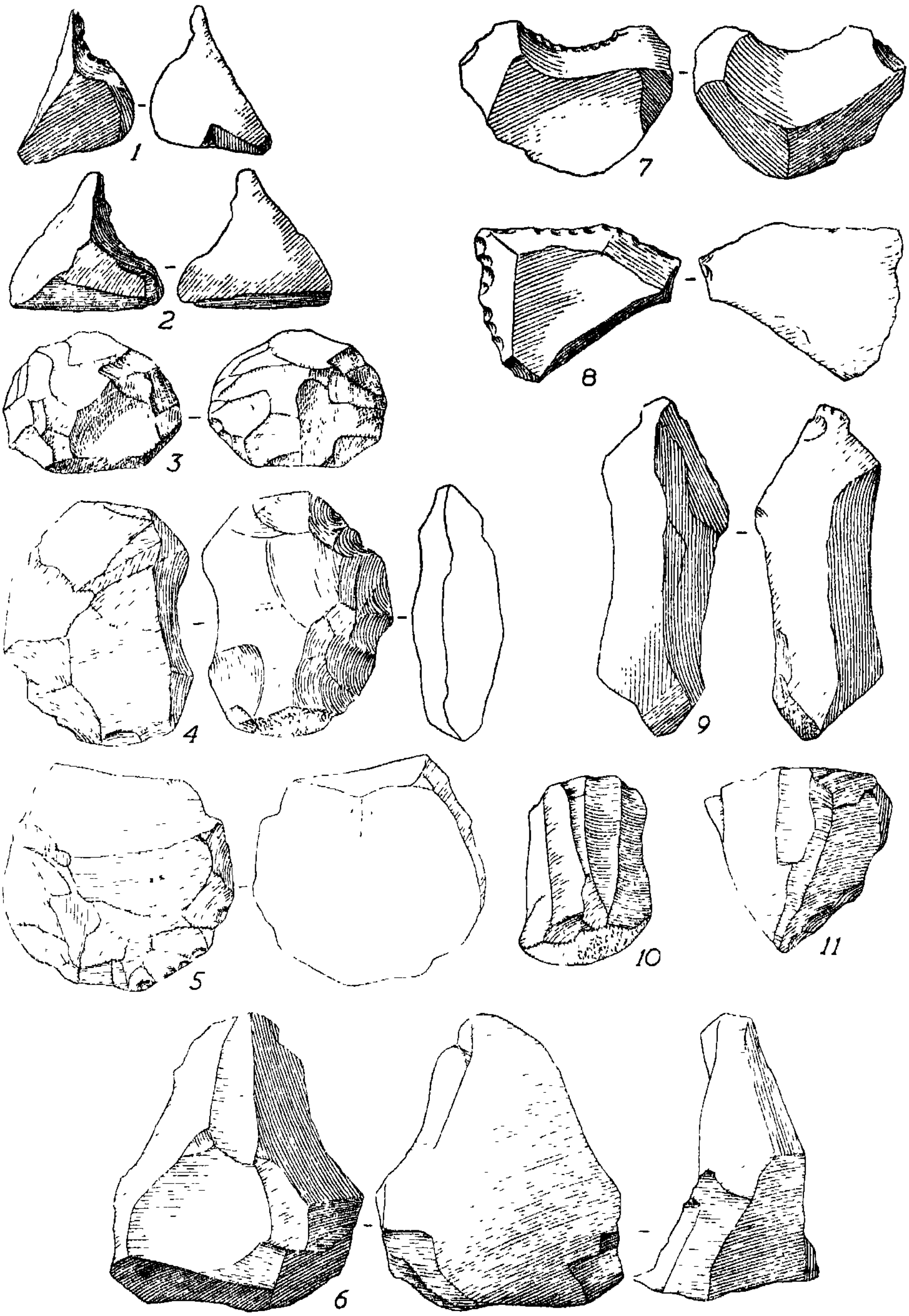

Kurikuppa
Daroji
R. Tungabhadra
Gadiganur
Sanganakallu
Hampasagar
Bellary
R. Pennar
Brahmagiri
R. Hagari
Nyamati
Chitradurga
Shimoga
Talya
Jyankal
Miriyur
Kaldurga
Kadur
ARABEAN SEA
Nidaghatta
Karadigudda
Tumkur
Chikmagalur
Lingadahalli
Kibbanahalli
Biligere
Jalahalli
Kolar
Hassan
Bangalore
R. Cauvery
Mandya
Mysore
Ranganathapura
PALAEOLITHIC AND MICROLITHIC SITES IN MYSORE
0 50
Miles
Microlithic Sites
Excavated "
Paleolithic "
Modern Towns

PLATE VI



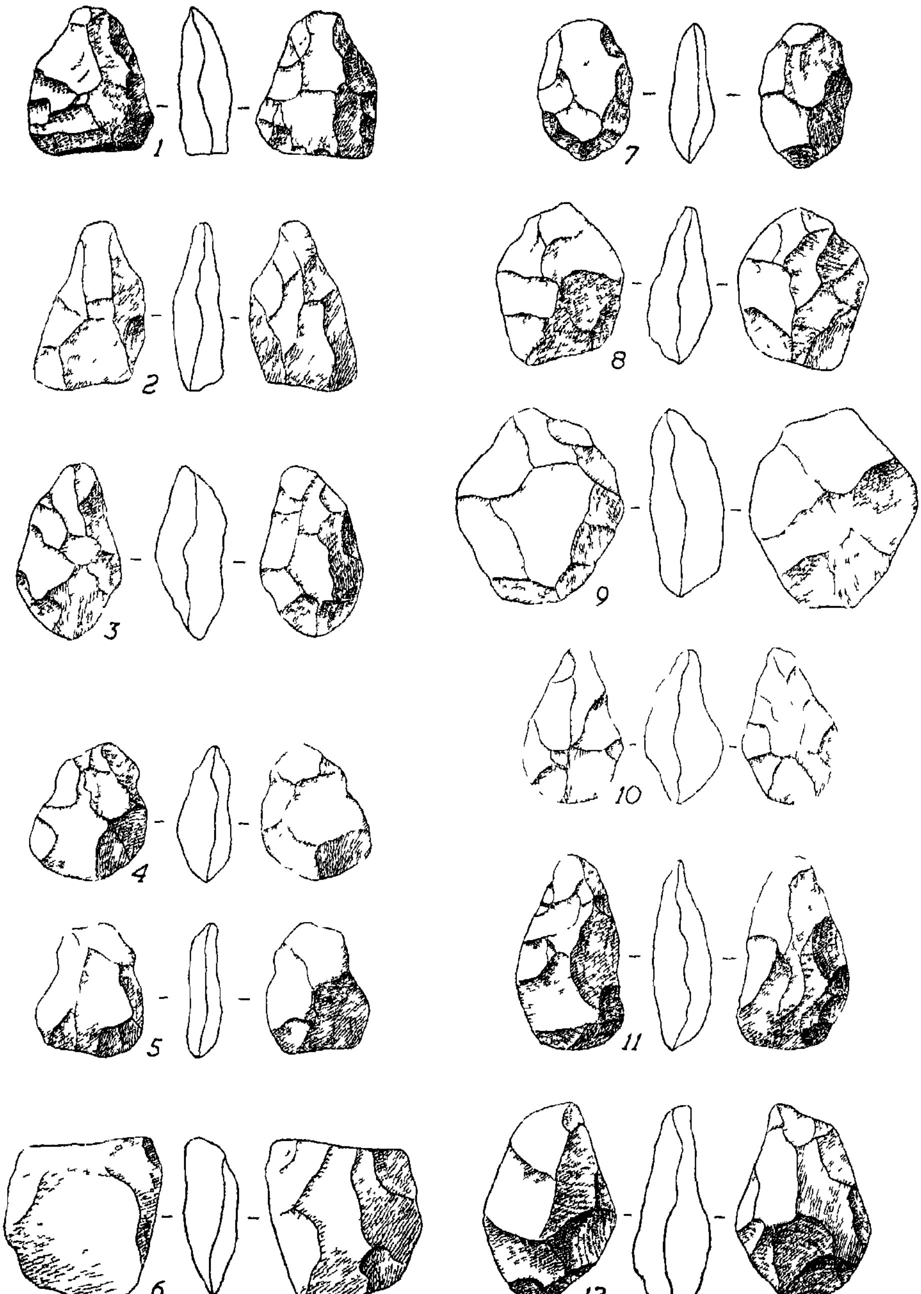
Palaeolithic implements from Kibbanahalli (¼ nat size).

Plate VII



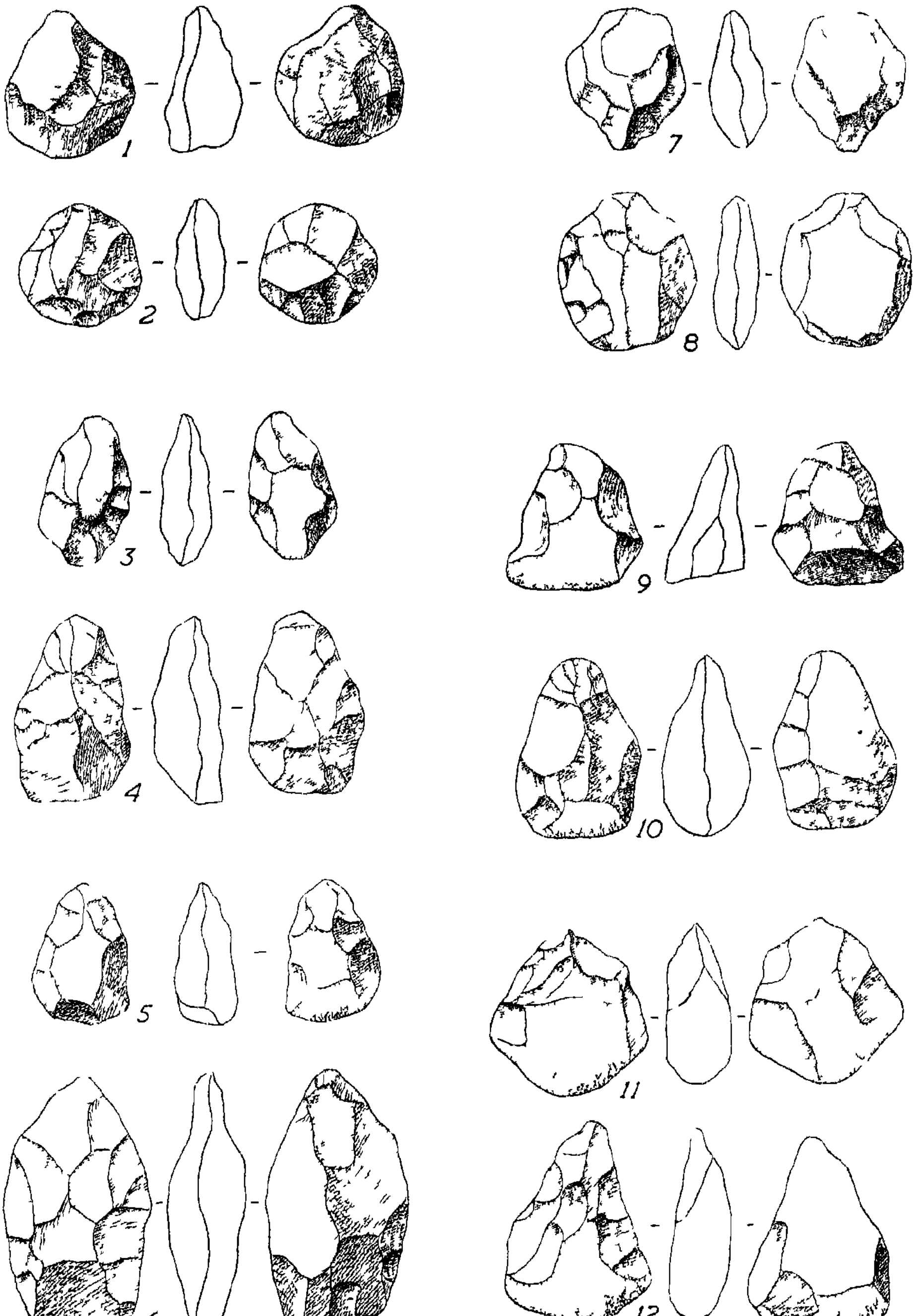
Palaeolithic implements from Kibbanahalli (¼ nat. size)

Plate VIII

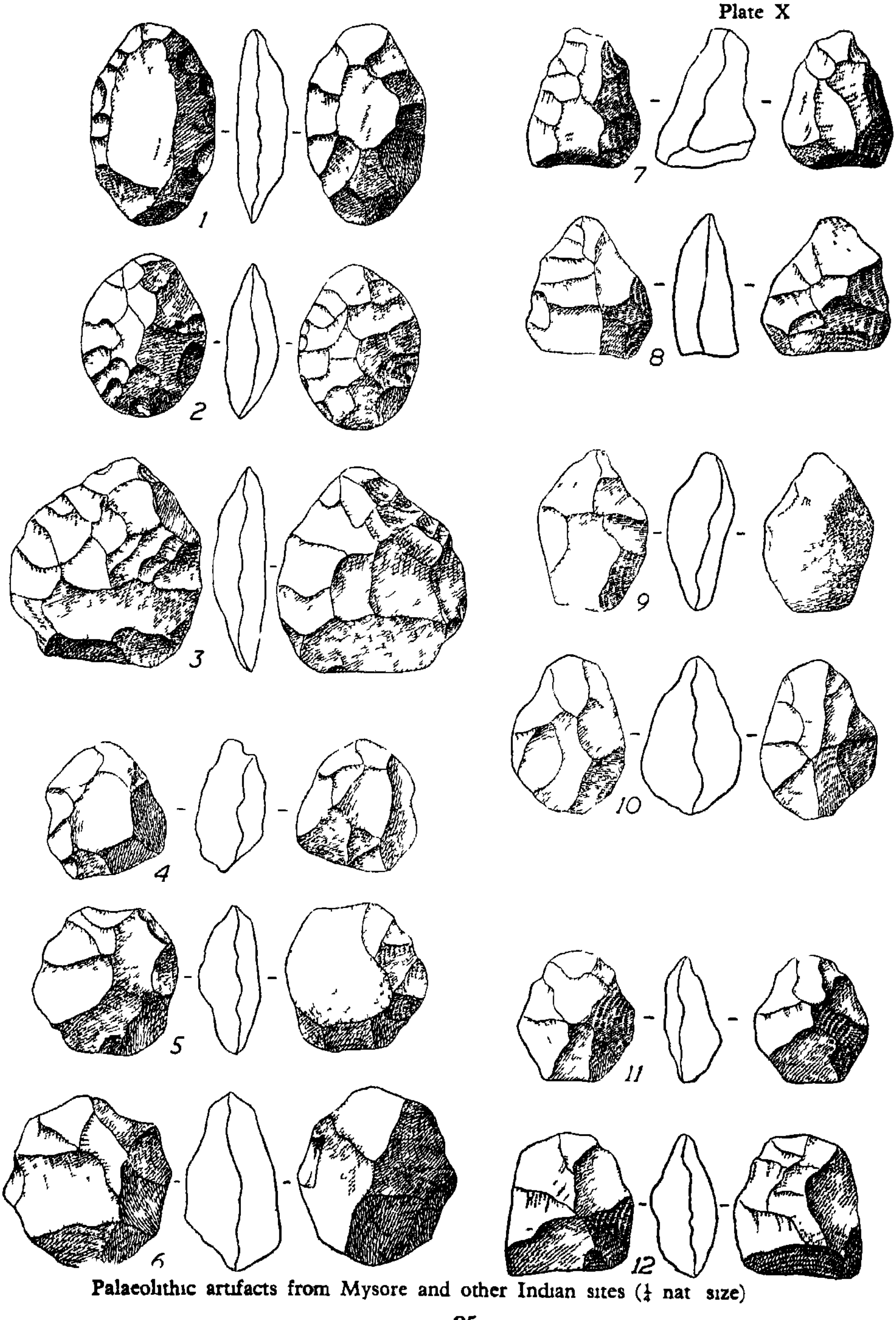


Palaeolithic artifacts from Mysore and other Indian sites (¼ nat size)

Plate IX

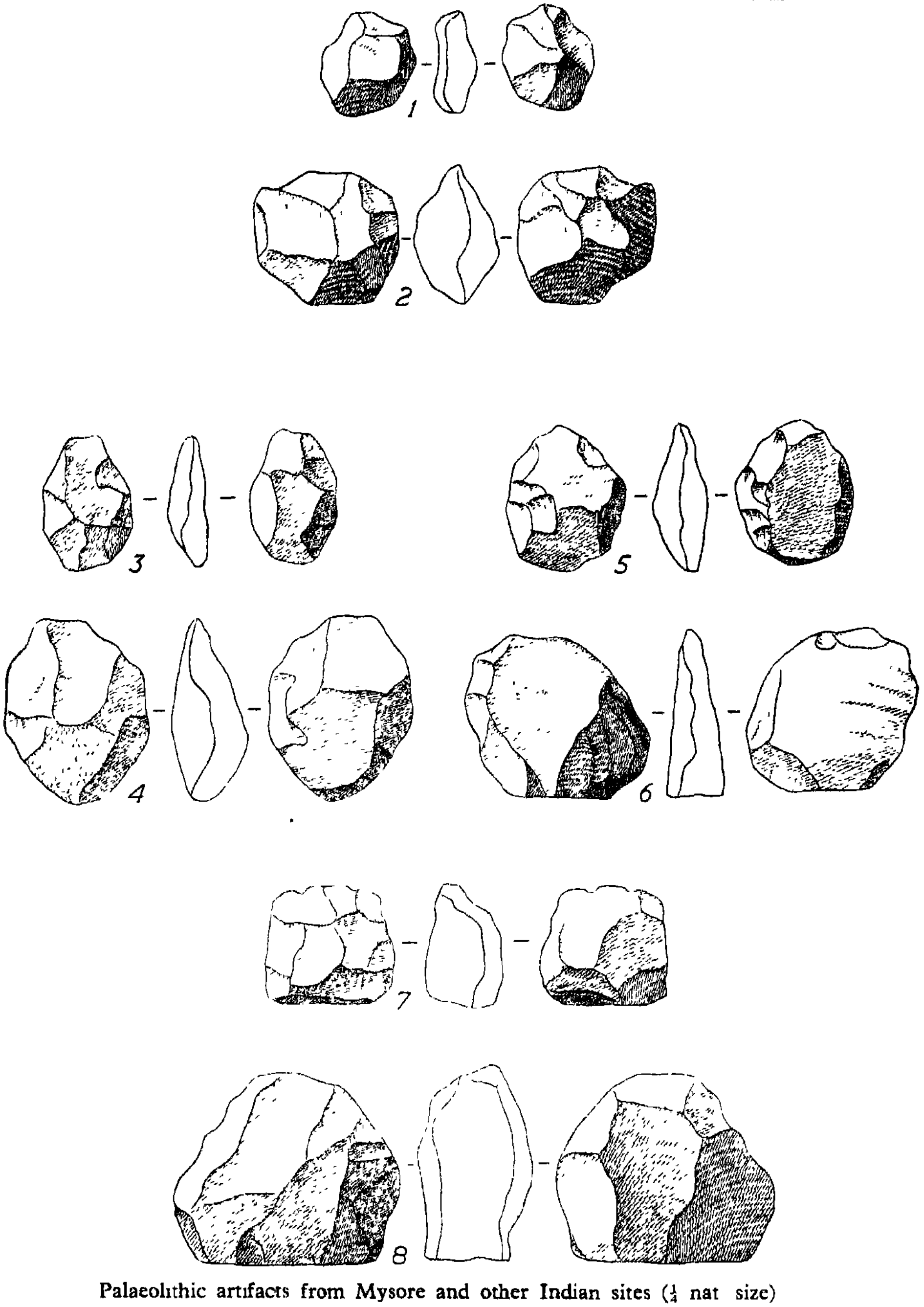


Palaeolithic artifacts from Mysore and other Indian sites (¼ nat size)



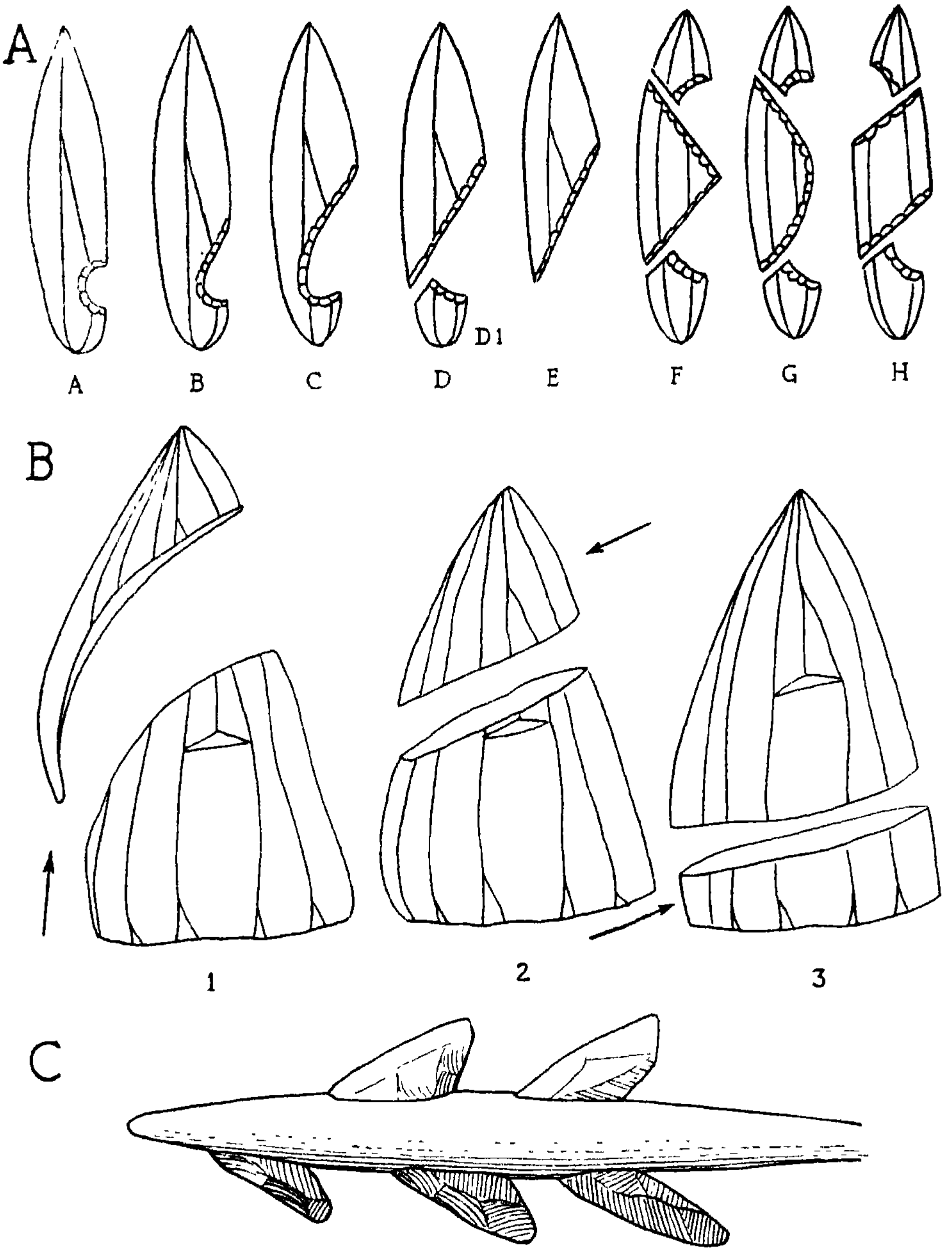
Palaeolithic artifacts from Mysore and other Indian sites (½ nat size)

Plate XI



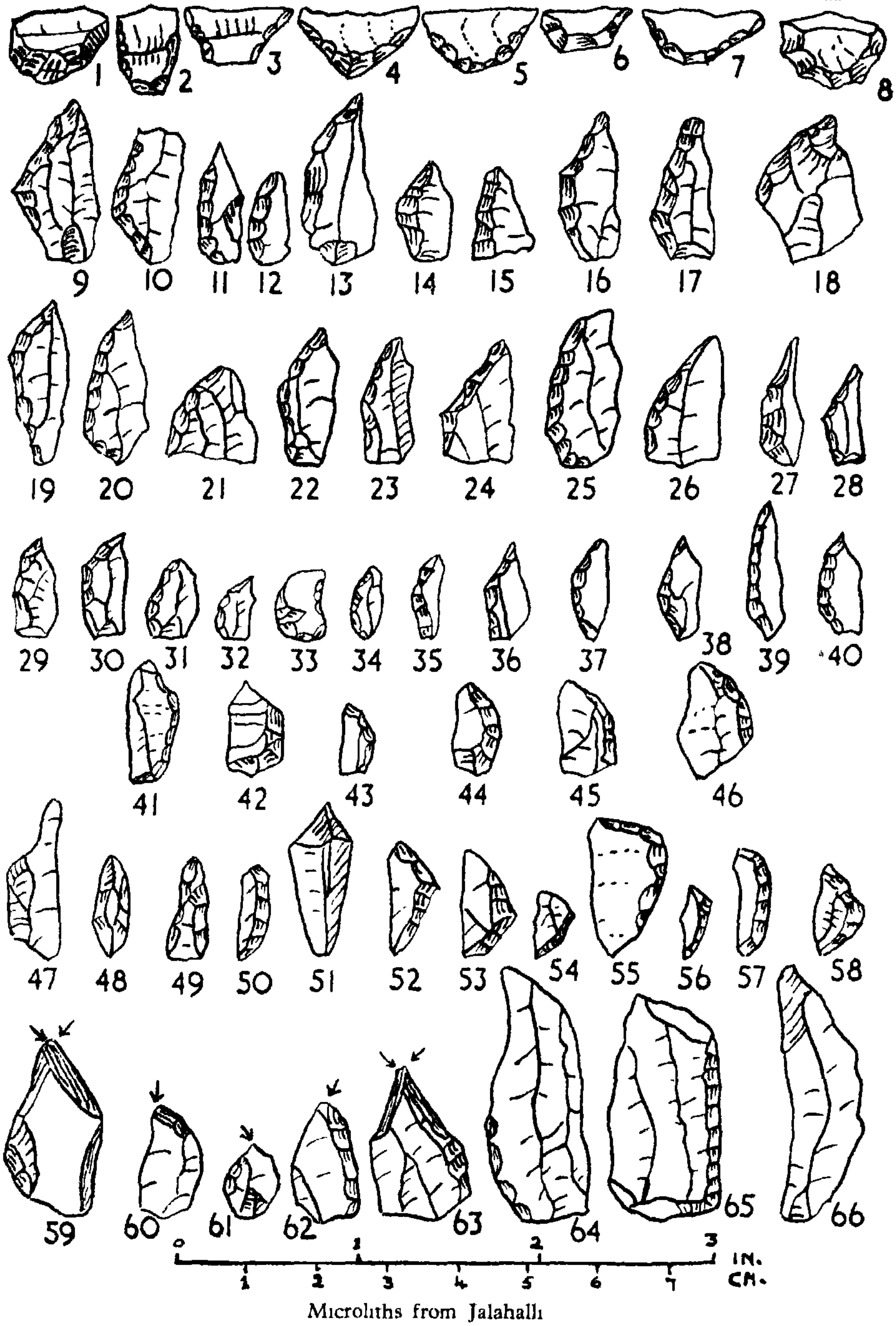
Palaeolithic artifacts from Mysore and other Indian sites (¼ nat size)

Plate XII



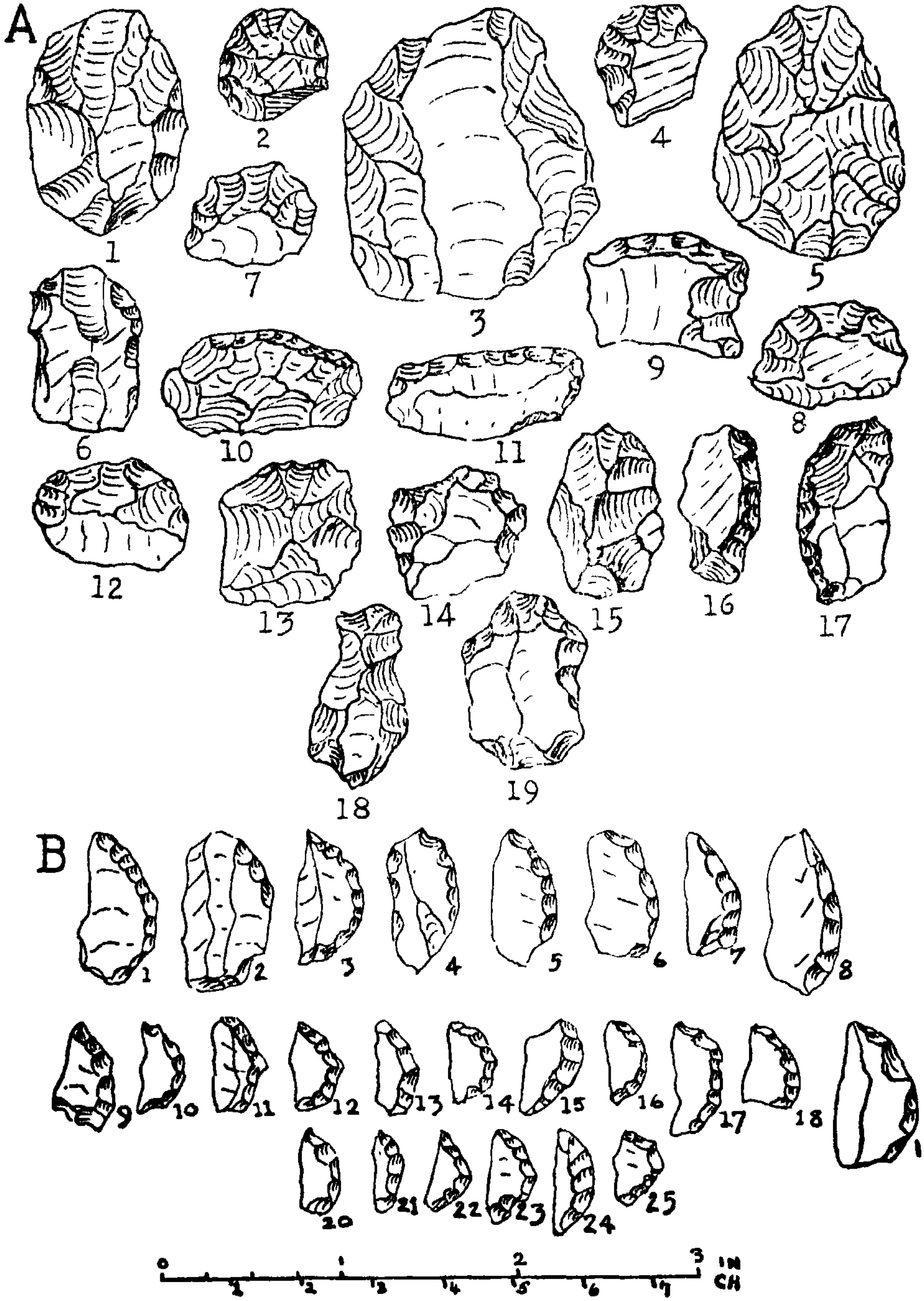
The fabrication and use of microliths.

Plate XIII



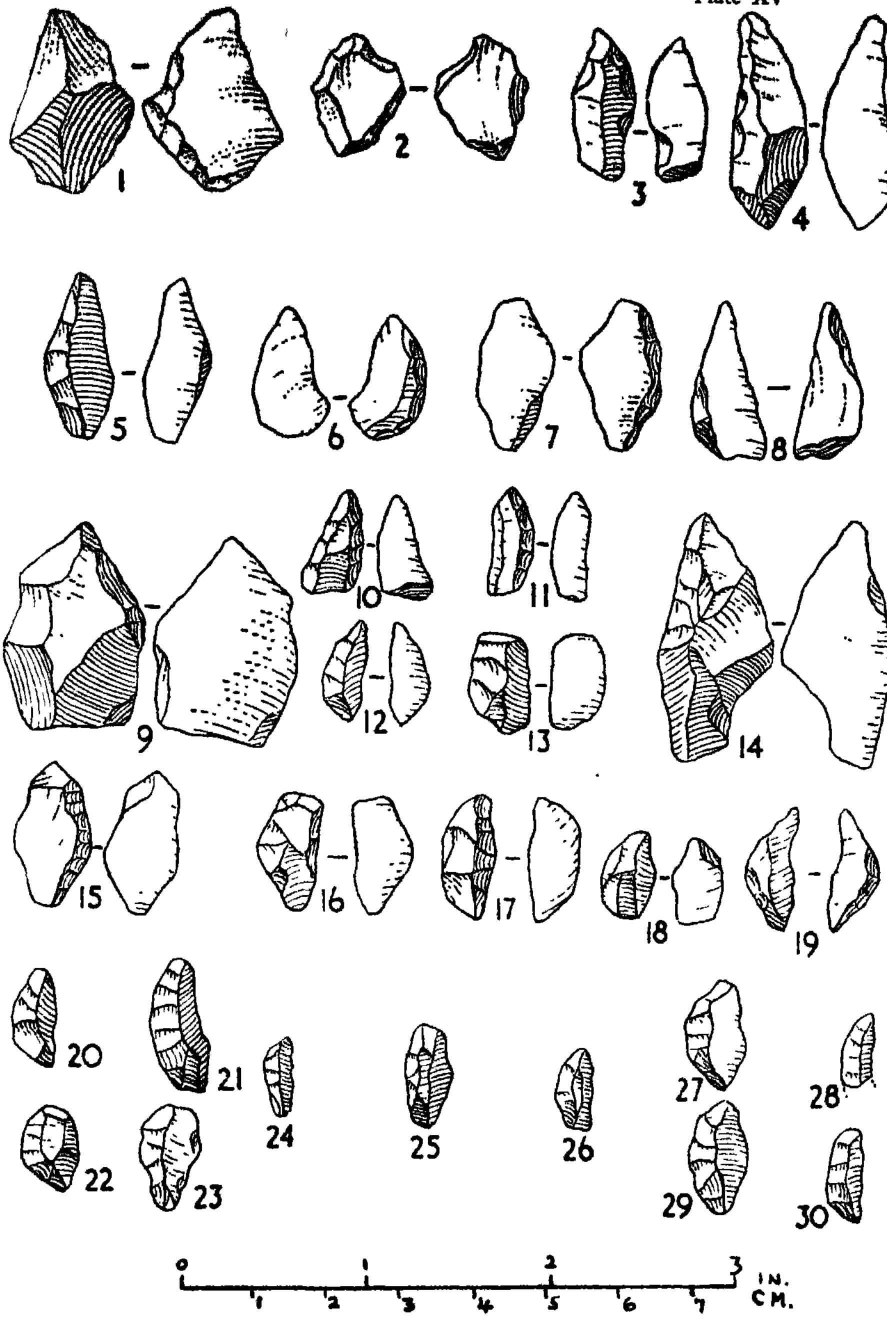
Microliths from Jalahalli

Plate XIV

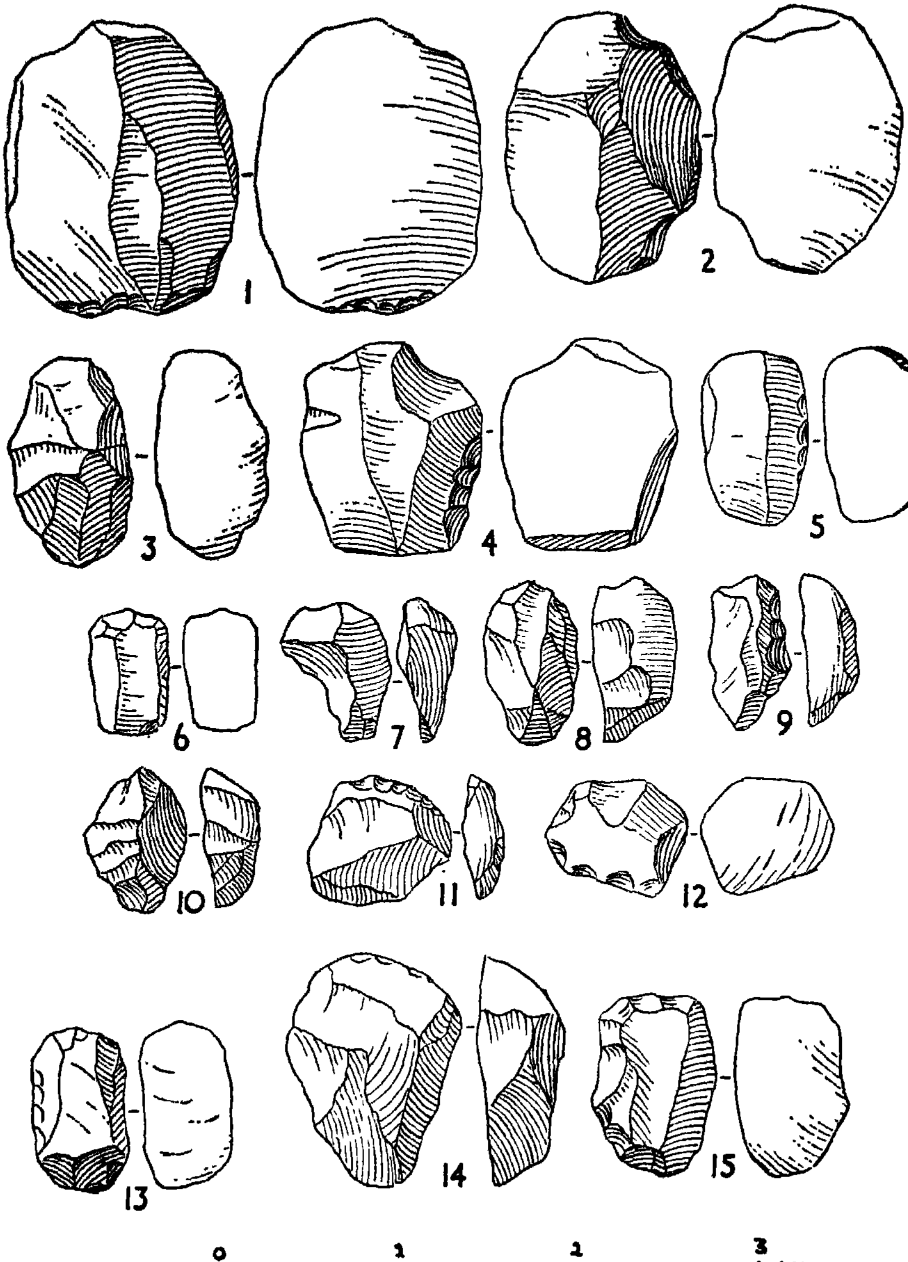


Microliths from Jalahalli.

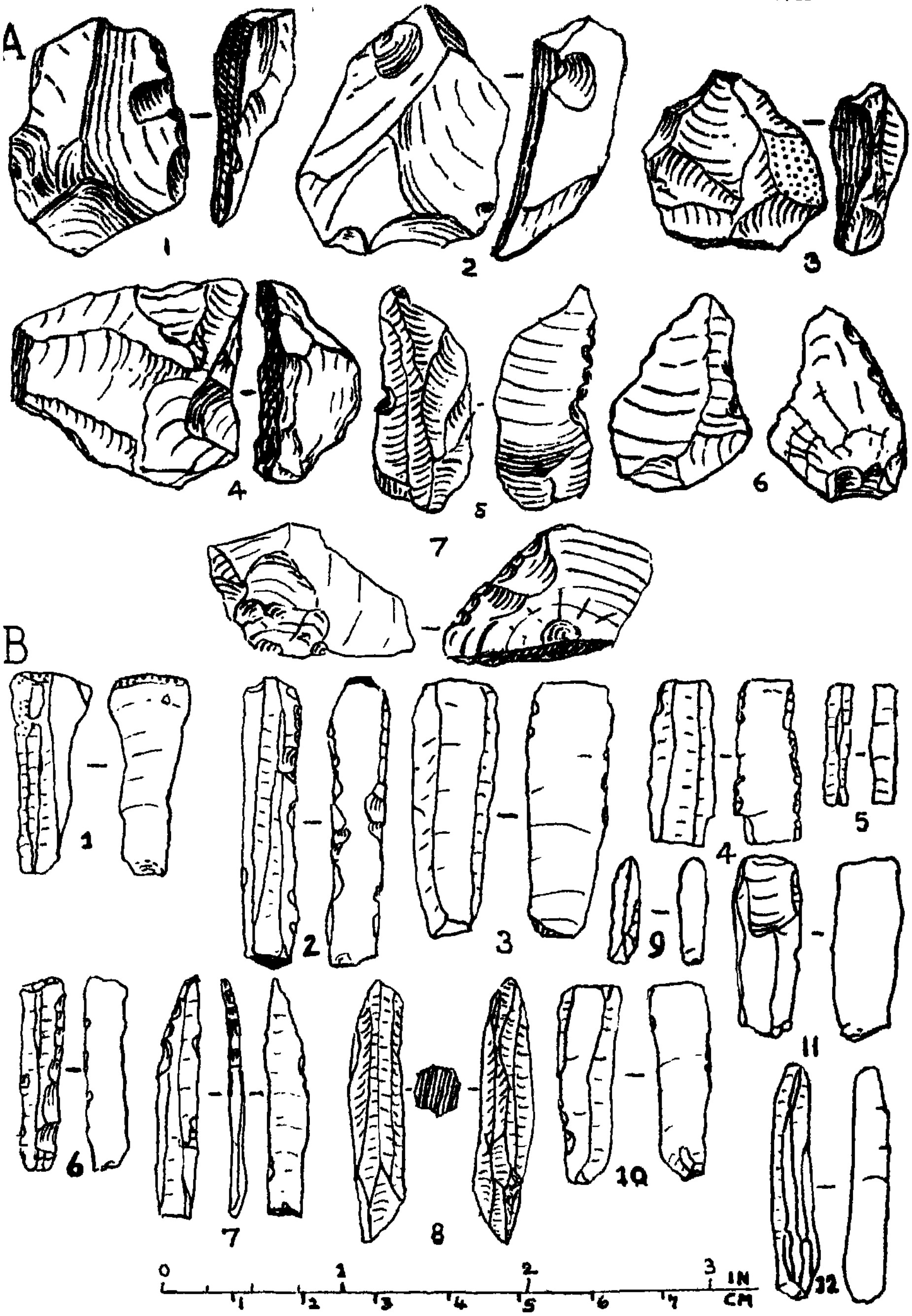
Plate XV



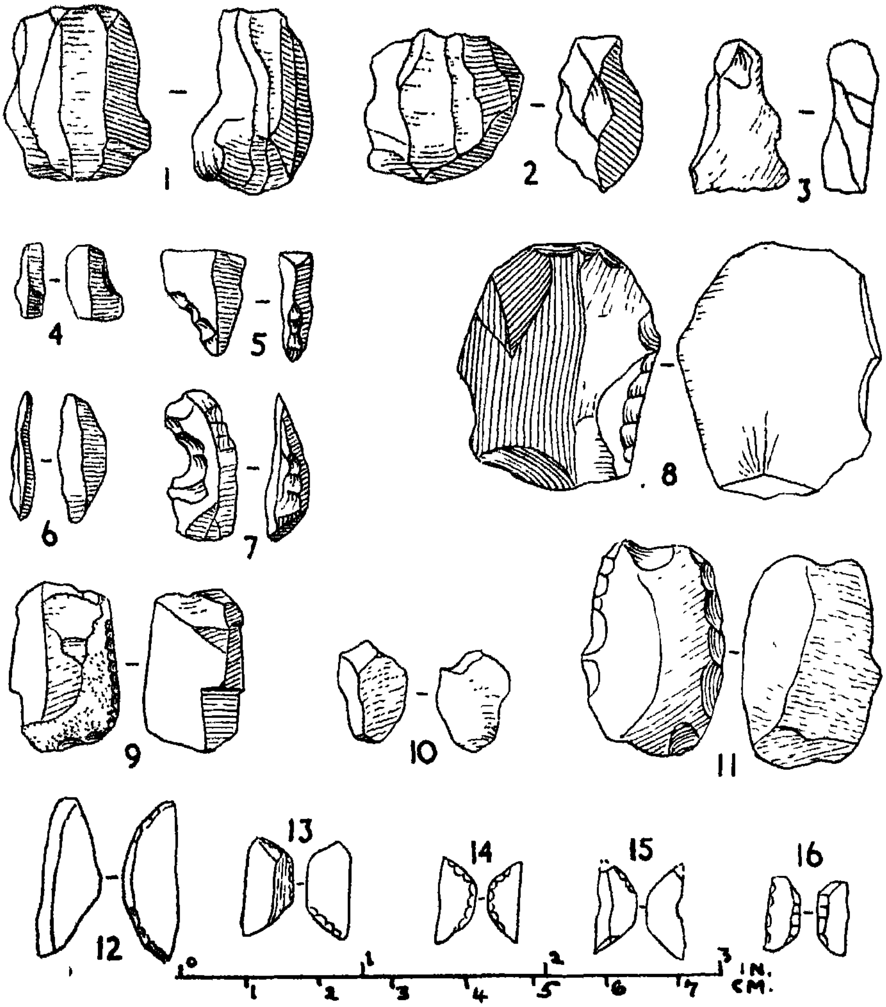
Microliths from Bangalore.



Scrapers from a site near Bangalore.

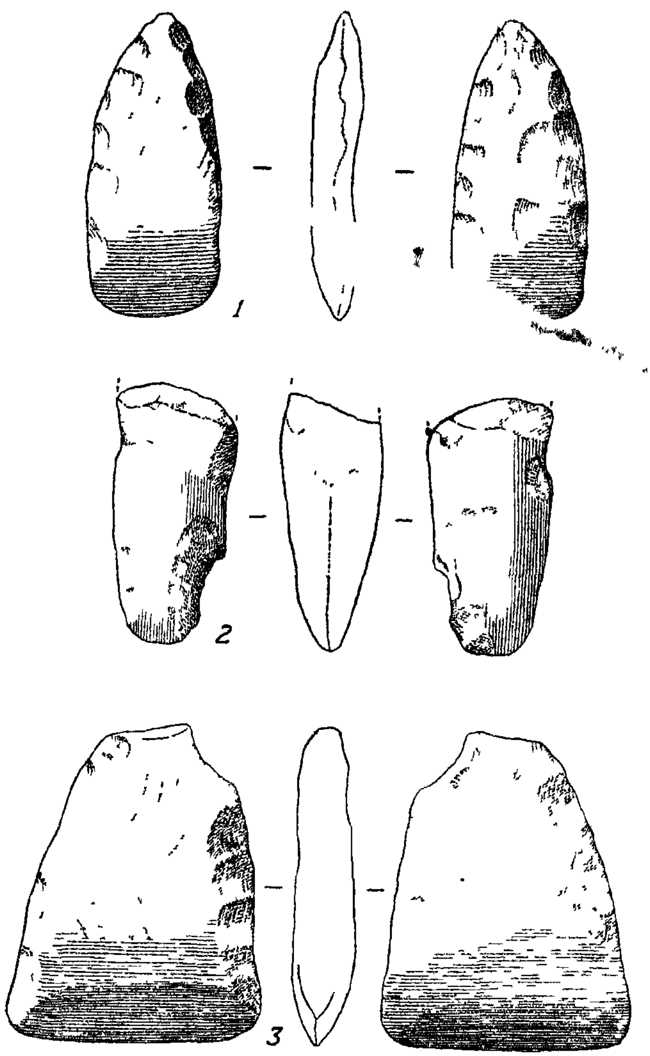


Microliths from Brahmagiri.

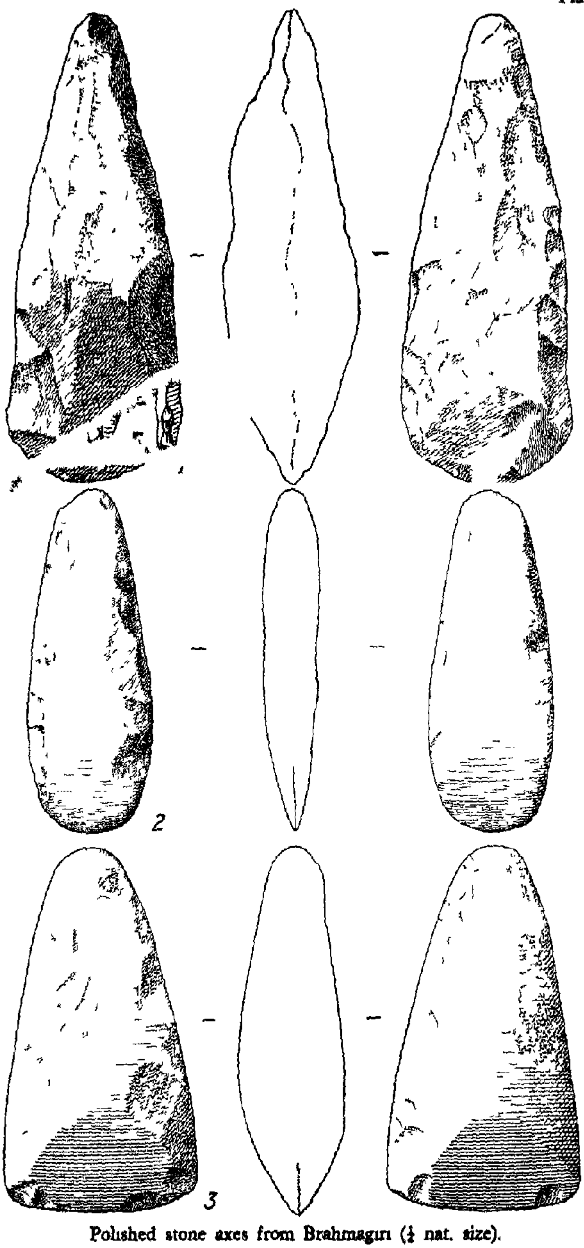


Microliths from Kibbanahalli.

Plate XIX



Polished stone implements from Brahmagiri (½ nat size)



Polished stone axes from Brahmagiri (½ nat. size).